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MELVILLE T. COOK, EDITOR

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RECORDS OF VIRUS DISEASES OF PLANTS IN PUERTO RICO

MELVILLE T. COOK, *Plant Pathologist,*
Agricultural Experiment Station, Río Piedras, P. R.

These records are published at this time for the use of those workers who may be interested in the subject. Although the data is not complete it is made available for those who may want to use it.

AMARILIDACEAE

Eucharis grandiflora Planch (*E. Amazonica* Linstl.) This species is attacked by a mosaic which was reported by the writer in 1931. Up to the present time the writer has not found an individual of this species that did not show the disease. This disease is mentioned in the literature but the writer has not been able to find the first record. Bremer reported a stripe disease in 1926 which may be the same.

BIXACEAE

Maximiliana vitifolia (Willd) Krug & Urban. This is an introduced plant which has developed very pronounced mosaic patterns ranging through shades of green and yellow. It has been transmitted by budding. First published record.

BROMELIACEAE

Ananas ananas (L) Cockerell. The yellow spot and wilt diseases have been introduced from Hawaii on two shipments of slips of the smooth Cayenne variety, one in 1923 and the other in 1931. Both shipments were kept under observation for about two years and appeared to be perfectly healthy. In 1934 the yellow spot and wilt diseases (which are well known in Hawaii) were found in both plantings and they were placed under quarantine. These diseases corresponded to the descriptions of the diseases in Hawaii and have been controlled by controlling the ants.

A very similar symptom has appeared on the Cabezona pineapples in the vicinity of Lajas. This diseased condition has been known for several years and this variety has been degenerating, but the writer and others who have visited that region have failed to determine the cause of the trouble. Recent studies by the writer indicate that the disease is similar to yellow spot and wilt diseases of Hawaii but that the symptoms are not exactly the same. The writer plans to continue his studies on this disease.

The writer also found the spike disease in the Cabezonas recently. This disease was reported from Puerto Rico a number of years ago but has not been found during the past thirteen years that the writer has been on the Island.

COMPOSITAE

Bidens cynapiifolia H. B. K. This plant is subject to severe attacks of mosaic. In its mild form the disease produces a pattern which may be described as more or less blotchy in character. In the severe forms the leaves are more or less deformed.

CUCURBITACEAE

Cucumis sativus L. The mosaic disease was very severe during growing (winter) season of 1935–36. Many fields in the eastern part of the Island showed an infection of 100 percent. This is the first severe outbreak of this disease that has come to the attention of the writer during past thirteen years of residence on the Island. During that time the writer was never able to find more than one or two diseased plants in any planting.

DIOSCORIACEAE

Dioscorea sp. (cultivated variety). Some plants have been found showing well defined mosaic patterns and others that were uniformly chlorotic. The exact nature of this disease has not been determined.

EUPHORBIACEAE

Adenoropium gossypifolium L. A mosaic disease was reported by the writer in 1931. Recent studies indicate that it is not transmitted by the seeds but it is very easily transmitted by budding.

GRAMINEAE

Zea mays L. The writer has found a stripe disease of corn which appears to be the same as the stripe diseases reported by

Britton Jones (1923) in Trinidad and by Stahl (1927) in Cuba. This disease is characterized by cholorotic stripes following the veins of the leaves. These stripes are very narrow. The stripe symptoms appear on the upper 4 or 5 or 6 leaves only. In the first generation, some of the plants will be barren. In the second generation many seeds will not germinate, many plants will be dwarfed and barren, the larger plants will show the stripe symptoms and some of them will be barren. In the third generation these symptoms will be intensified and very few plants will produce grain. The disease is transmitted in the seeds.

LEGUMINOSEAE

Bradburya virginiana L. Kuntz. This species is subject to a well defined mosaic which is probably the same as the common bean mosaic. The experiments made by the writer indicate that it is not transmitted by seeds but *Aphis rumicis* is the probable vector.

Crotalaria anagyroides H. B. K. This species is subject to a mosaic which appears to be the same as the one on *C. striata* which was reported by the writer in 1931. Tests indicate that it is not transmitted in the seeds.

Crotalaria usaramoensis E. Baker. This species is subject to a mosaic which appears to be the same as the one on *C. striata* which was reported by the writer in 1931. Tests indicate that it is not transmitted by in the seeds.

Phaseolus lunatus L. This species is attacked by a virus which is probably the same as the common bean mosaic. Tests thus far indicate that it is not transmitted by the seeds. The writer suspects that *Aphis rumicis* may be the vector but we do not have any experimental proof.

MALVACEAE

Althae rosea (L.) Cav. This species is affected with a mosaic which was reported by the writer in 1935. Tests up to the present time indicate that the disease is not transmitted by the seeds but by an unknown insect vector.

MUSACEAE

Musa sp. The writers attention has been called to a mosaic disease of banana. This disease has been reported from other parts of the world. It is very rare in Puerto Rico.

Musa sp. A virus disease or virus-like disease is very abundant on the "enano" plantain in Puerto Rico. This disease appears to be very different from the bunchy top disease of the Far East and

does not correspond to the descriptions of diseases recently reported from Florida and Trinidad. Thus far it has been found on but one variety.

The spirals of diseased plants do not unroll properly. Sometimes they are bent to form hooks. Parts of the outer leaf may become dead, brown and torn by the growth of the inner parts. When the leaves of the spiral are first unrolled, they are chlorotic and crinkled and in severe cases become brown and die.

PASSIFLORACEAE

Passiflora laurifolia L. This is a very severe but rare chlorotic disease. The leaves are underveloped in size and irregular in shape. The writer has not demonstrated that this disease is due to virus.

STERCULIACEAE

Helicteres jamaicensis Jacq. A very pronounced case of a mosaic on this species was brought to the writer June, 1936, by Mr. W. A. McCubbin. Although we have no experimental proof that this is a virus disease the symptoms are so characteristic that it should be included in these records.

PHLOEM NECROSIS IN THE STRIPE DISEASE OF CORN

By MELVILLE T. COOK, *Plant Pathologist,*
Agricultural Experiment Station, Río Piedras, P. R.

Phloem necrosis has been reported for a number of plants infected with virus diseases, especially potatoes, tomatoes and beets, and may occur in many other plants infected with virus diseases. It is possible that it may be a diagnostic symptom in some types of virus diseases. However, this symptom must be studied in a much larger number of host plants and with a much larger number of viruses before its value in diagnosis and classification can be determined with certainty. We should also have a more complete knowledge of its appearance in plants with diseases due to other causes.

Gilbert (**9**) in a paper on correlation of foliage degeneration diseases of the Irish potato with variations of the tuber and sprout said—"Net-necrosis, of the phloem-necrosis type, is correlated in the tubers with a spindliness of sprout and seems to be a consistent symptom of leaf-roll. The necrosis symptoms are not persistent in the progeny tubers". A few years later (**10**) he reported that he had demonstrations of direct relation between leaf-roll and net necrosis. Quanjer (**12**) who has probably made a more extensive study of phloem-necrosis than any other worker on this subject made an attempt to classify and name potato viruses on the basis of the necrosis characters. Various forms of necrosis produced by several viruses in several species of plants have been studied by many workers during the past quarter of a century. It is a fruitful field of research for both plant histology and plant physiology.

November 17th, 1934, the attention of the writer was called to an outbreak of a white stripe disease of corn growing in a garden on the Agricultural Experiment Station farm. The symptoms of the disease corresponded with the descriptions by Stahl in Cuba (**13**) and Britton Jones (**1**) in Trinidad.

Some of the plants were very much dwarfed and did not produce ears. Others were full sized, some of them producing ears and others barren. The tendency to sterility was very pronounced. So many of the plants were sterile that it was difficult to find an ear satisfactory for seed. A plant in which the symptoms were fairly

good was selected and cross-polinated from a plant in which symptoms were very pronounced. Chlorosis of the upper leaves was characteristic in all cases and the pattern was that of stripes which followed the veins of the leaves. In some cases a single white vein ran through a dense green leaf. In other cases the leaf was almost white.

Four plants were selected and pieces of the leaves fixed for sectioning. These pieces were sectioned and stained for study.

Phloem necrosis was found in every case ranging from a very slight to a very pronounced necrosis (figures 1 to 5). In some few cases a similar condition was found in the parenchyma (figures 7, 8, 9, 10, 11). In the most severe cases there was a complete breakdown (figure 6) of many cells. In some cases there was an increase in the number of fibrous cells next to the epidermis and a thickening of the walls of these cells. The phloem necrosis was acompanied by a thickening of the walls of the epidermis cells, the fibrous cells and sheath (figures 1 to 5 and 12, 13). In some cases these cells developed thick walls, although there was no phloem necrosis (figure 12). Esau (1934) in a paper on curly-top of sugar beet reported "a collapsed parenchyma that had undergone degeneration and necrosis".

In the most extreme cases the part of the leaf in which the stripe was located was very thin (figure 12), but this was not necessarily accompanied by phloem-necrosis.

The effect on the cell contents was very noticeable. The chloroplasts in the sheath cells of the bundles with necrosis and the parenchyma cells around such bundles were few in number (figure 14) while the corresponding cells in a section from a healthy plant showed a large number of chloroplasts (figures 15, 16). The chloroplasts in the cells in healthy plants where somewhat larger in size than those in cells from chlorotic regions of diseased plants. There was no evidence of disintegration but abundant evidence of inhibition. This is in harmony with the work of the writer on mosaic diseases of sugar cane and other plants (**3**, **4**, **5**). In this connection it should be noted that Esau reported disintegration in two papers on curly top of sugar beet (**6**, **7**).

The nuclei in severely infected regions showed evidence of disintegration. Esau (**7**) reported hypertrophy of the nuclei in sugar beets infected with curly top.

Intracellular bodies were not seen.

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EXPLANATION OF PLATES

Figure 1.—Cross section of a leaf showing necrosis just above the lower epidermis.

Figure 2.—Cross section of leaf showing very slight necrosis.

Figure 3.—Another section showing same condition, but more pronounced.

Figure 4.—A section showing same conditions accompanied by a pronounced thickening of the epidermis.

Figure 5. A section showing necrosis and thickening of walls in the epidermis.

Figure 6.—A severe case in which there is a breaking down of cells in the fibro-vascular bundle.

Figure 7.—Necrosis and thickening cell walls in the parenchyma.

Figure 8.—Necrosis in the parenchyma adjacent to the sheath cells of the fibro-vascular bundle.

Figure 9.—A more pronounced case of necrosis in the parenchyma cells.

Figure 10.—A very pronounced case of necrosis next to the epidermis.

Figure 11.—A very pronounced necrosis surrounding a very small fibro-vascular bundle.

Figure 12.—A very pronounced thickening of cells of the epidermis. Note that the leaf is very thin in one place.

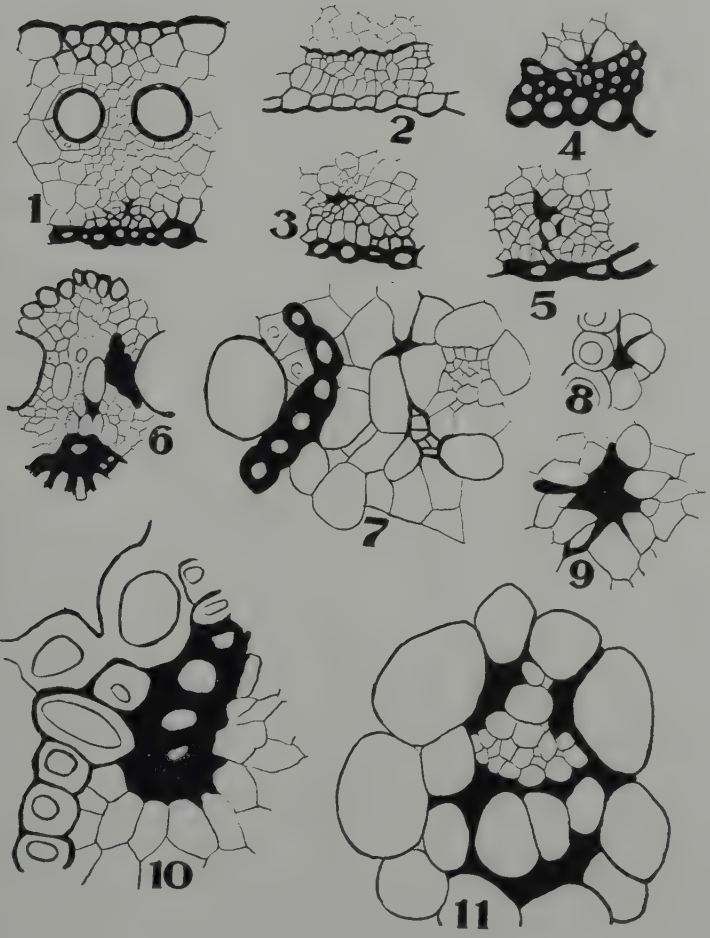
Figure 13.—Thickening of the walls of the epidermis and adjoining cells. Also the walls of the sheath cells surrounding a fibro-vascular bundle.

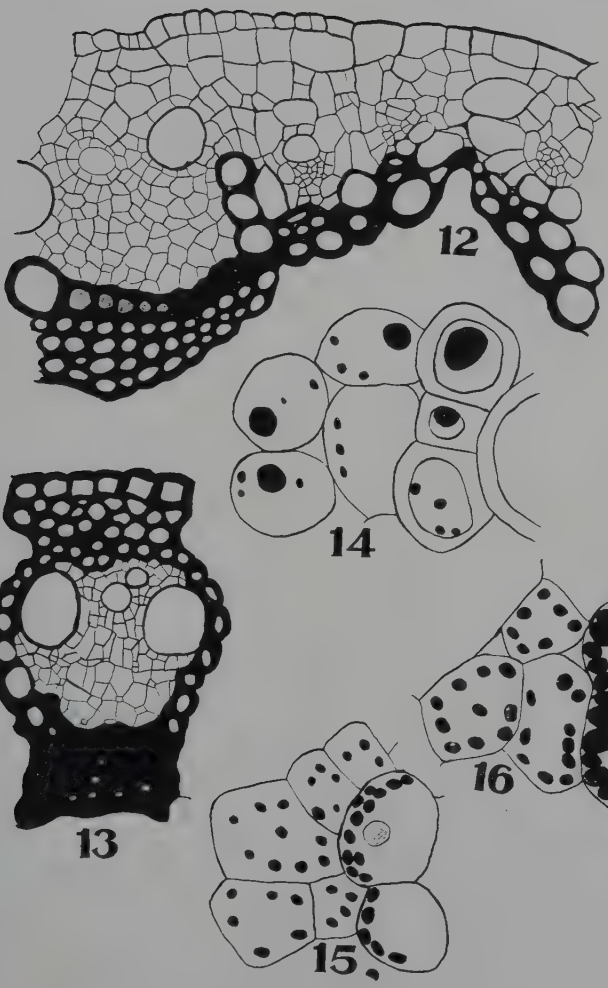
Figure 14.—Sheath cells and adjoining cells of a severely infected plant. Note that the chloroplasts are very few and very small.

Figure 15.—The same from a slightly infected plant.

Figure 16.—The same from a healthy plant.

PLATE I

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DESCRIPTIONS OF VIRUS DISEASES OF PLANTS: CRITICISMS AND SUGGESTIONS

MELVILLE T. COOK, *Plant Pathologist*,
Agricultural Experiment Station, Río Piedras, Puerto Rico

The work of the writer on the index of host plants of virus diseases and on the index of insect vectors of virus diseases of plants has brought to light a considerable number of incomplete and in some cases incorrect records in connection with virus diseases of plants. Most of these records were satisfactory at the time they were made but the lapse of time and the increase in the literature makes some of these early records rather obscure or indefinite. It is very doubtful if some of these records could have been made more definite or complete at the time the papers were writen but there is no reason for our continuing to make similar errors in the future.

Tobacco mosaic was a satisfactory term until we found that there were several mosaic diseases of tobacco. It then became necessary to use a qualifying word such as "yellow mosaic", "interveinal mosaic", "aucuba mosaic", etc., and tobacco mosaic became "common tobacco mosaic". Our records would be much more satisfactory and much less likely to be misinterpreted in the future if the writers would insert qualifying terms before the names, even though it is a case of first virus disease reported on that particular host. Certainly the term "new virus disease" is unsatisfactory in all cases.

Records of new virus diseases of plants without definite names, numbers or letters and without descriptions of symptoms are not satisfactory and are likely to lead to confusion in the future. The term "new virus" is not satisfactory either now or in the future. A "new virus disease" today is an old virus disease tomorrow and another worker may present another "new virus disease" at any time in the future.

The use of the generic name of the host plant without the specific name is unsatisfactory. It is usually possible to secure the specific names except in the cases of cultivated varieties. In these cases the scientific name of the host from which the variety was derived should be given if possible.

When common names of host plants are used, the scientific names should be inserted in the titles, introductions or in parenthesis fol-

lowing the common name. The peanut of most parts of the United States is "gruber" in some parts of the country and in many parts of the world it is "ground nut", but it is *Arachis hypogea* in all parts of the world. Common names of host plants should rarely, if ever, be used unless accompanied by the scientific names.

The same rule applies to the use of common names of insect vectors. The writer has found a considerable amount of confusion arising from the use of common names of insect vectors. The use of the terms "leaf hoppers" or "aphis" may mean very little without explanation in any part of the world except the locality in which it was writen. The writer has found that it is sometimes difficult to know whether two writers were referring to the same or two different insects. Common names of host plants and insect vectors may be satisfactory at the time and in the country in which a paper is writen but may be very unsatisfactory in the future and in other parts of the world.

Reprints should always carry the name of the publication in which they appeared and dates of publication. The paging should be the same as in the original publication.

FIRST SUPPLEMENT

TO THE

HOST INDEX OF VIRUS DISEASES OF PLANTS *

MELVILLE T. COOK, *Plant Pathologist,*
Agricultural Experiment Station, Río Piedras, Puerto Rico

This supplement contains many records of host plants that were omitted from the first paper. Some of these records have been published since the publication of the first paper, others were not available to the compiler and others were held for more complete data which is now available. Furthermore, it has been found advisable to insert certain data which it was not intended to include when the first paper was published.

The preparation of the index is much more difficult than was anticipated by the compiler. Some of these difficulties were given in the first paper. Some of the additional difficulties are: (1) the recognition of many strains of viruses which give somewhat different symptoms, (2) the production of different symptoms on different host plants when inoculated with the same virus, (3) the mixture of viruses in a single host plant, (4) the variations of symptoms due to different methods of inoculation and (5) the influence of environmental factors, especially temperature, on the expression of symptoms. All these difficulties and many others of more or less importance have complicated the work of the compiler.

As a result of a study of the literature the compiler is of the opinion that it is impossible to make a satisfactory index until the various viruses have been identified and described. However, the compiler hopes that this index and its supplements may be useful to the students of virus diseases until a more satisfactory index can be made.

Ten families, more than 50 genera and about 150 species have been added to the index. Varieties of host plants have not been including, although it is well known that varieties within a species may react very differently to a single well known virus. No attempt has been made to classify the viruses. It is very evident to students of the subject that some of the diseases recorded under distinct

* Journal of the University of Puerto Rico. 19(3): 315–406. July, 1935.

names may be due to a single virus and that the number of diseases recorded in the index is greater than the number of viruses recognized at this time.

This supplement makes this index fairly complete and up to date. There are many duplications and much confusion due to different names being applied to a single disease and to our lack of knowledge of the true nature of the viruses and the range of host plants of each virus. The compiler hopes that the index will be helpful for the workers and that it will aid in the making of a usable classification of the viruses.

AMARANTHACEAE

AMARANTHUS BLITOIDES

Mosaic, Doolittle and Walker, Wisconsin, 1925.

AMARANTHUS CAUDATUS

Curly top of sugar beet, Severin and Freitag, California, 1933, I by *E. tenellus*.

AMARANTHUS DEFLEXUS

Curly top of sugar beet, Severin and Freitag, California, 1933, I by *E. tenellus*.

AMARANTHUS RETROFLEXUS

Latent virus in potato, Jones and Burnett, Washington, 1934.
Fern Leaf of tomato, Jones and Burnett, Washington, 1935. Same as cucumber mosaic.
Sugar beet mosaic, Mouravieff, Novinenko, Russia, 1932.
Curly top of sugar beet, Severin, California, 1919, NI.

AMARANTHUS TRICOLOR

Curly top of sugar beet, Severin and Freitag, California, 1933, I by *E. tenellus*.

CELOSIA ARGENTEA

Curly top of sugar beet, Severin and Freitag, California, 1933, I by *E. tenellus*. Also the variety *cristata*.

GOMPHRENA GLOBOSA

Curly top of sugar beet, Severin and Freitag, California, 1933, I by *E. tenellus*.

AMARILIDACEAE

AGAVE CAUTALA

Mosaic, Phillipine Islands, No other data.

AGAVE RIGIDA var. SISALANA

Mosaic, Stanger, Belgian Congo, 1929, N.

AGAVE SISALANA

Mosaic, Phillipine Islands, 1925, No other data.

AMARYLLIS sp.
Spotted wilt of tomato, Gardner, Whipple and Tomkins, California, 1935. I. Reported a little later in England by Ogilvie.

EUCHARIS AMAZONICA
Mosaic. Cook, Puerto Rico, 1931, N. The compiler is of the opinion that this disease is very widely distributed. It may be the same as the stripe disease reported by Bremer in 1926.

HIPPEASTRUM sp.
Spotted wilt of tomato, K. M. Smith, England, 1936.

NARCISSUS sp.
Gray disease in the United States appears to be the same as the stripe disease in England.

NARCISSUS INCOMPARABILIS
Spike disease, Wolley Dod, England, 1894, I am not sure that this is the date of the first record. It is mentioned in a paper by Gould in 1935. Some workers class it as a virus disease.

NARCISSUS TAZETTA
Yellow dwarf of onion, Henderson, Iowa, 1935.

APOCYNACEAE

NERIUM OLEANDER
Chlorosis, F. F. Smith, Missouri, 1924.

VINCA (*Lochnera*) ROSEA
Spike disease, Varadaraja Iyengar, India, 1935.

ARACEA

HOMALOMENA CORDATA
Chlorosis, F. F. Smith, Missouri, 1926.

RICHARDIA (CALLA) AFRICANA
Spotted wilt, Ogilvie, England, 1935.

ZANTHEDESCHIA AETHIOPICA
Spotted wilt of tomato, K. M. Smith, England, 1935, N.

BASELLACEAE

BASELLA RUBRA
Mosaic of beet, Verplancke, Belgium, 1935.
Yellows of beet, Verplancke, Belgium, 1935.

BETULACEAE

CORYLUS AVELLANA
Mosaic, Atanasoff, Bulgaria, 1935.

BIXACEAE

MAXIMILIANA VITIFOLIA
Mosaic, Cook, Puerto Rico, 1936.

BORAGINACEAE

MERTENSIA VIRGINICA
Mosaic, Whetzel, New Jersey, 1928.

CAMPANULACEAE

CAMPANULA sp.
Mosaic. No data.

LOBELIA sp.
Spotted wilt of tomato, Holmes Smith, England, 1934.

LOBELIA CARDINALIS
Curly top of sugar beet, Freitag & Severin, California, 1935, I from sugar beet by *E. tenellus.*
Cucumber virus 1, K. M. Smith, England, 1936.

LOBELIA ERINUS
Curly top of sugar beet, Severin, California, I by *E. tenellus.*
Bigarrure of potato, Verplancke, Belgium, 1935.

CARYOPHYLLACEAE

DIANTHUS BARBATUS
Mosaic, Woods, Washington, D. C., 1919, N.

DIANTHUS CARYOPHYLLUS var. *heddewigii.*
Curly top of sugar beet, Freitag Severin, California, 1933, I from sugar beet by *E. tenellus.*

MONOLOPIA CHENOPODIOIDES
Aster yellows, Kunkel, New York, 1911. By *C. sexnotata.*

CHENOPODIACEAE

ATRIPLEX ELEGANS
Curly top of sugar beet. Severin. California. 1919.

ATRIPLEX PATULA
Mosaic of beet, Verplancke, Belgium, 1934.

BETA TRIGINA
Mosaic of beet, Verplancke, Belgium, 1935.

BETA VULGARIS
Cucumber mosaic, Johnson, Kentucky, 1930 Three types of a new virus, Blattny, Czechoslovakia.
Tupfelmozaik, fleckenmosaik, punktmosaik and kauselmosaik, Böning, Germany, 1927.
Sprenkel mosaic, nerven mosaic, marmor mosaic and poken mosaic, Verplancke, Belgium, 1935.

BLITUM EXSUCCUM
Mosaic of beet, Verplancke, Belgium, 1934
Yellows of beet, Verplancke, Belgium, 1934.

CHENOPODIUM ALBUM
Mosaic of sugar beet, Mouravieff, Novinenko, Russia, 1932.
Yellows of beet, Verplancke, Belgium, 1934.

CHENOPODIUM BONUS-HERICUS
Mosaic of beet, Verplancke, Belgium, 1934.
Yellows of beet, Verplancke, Belgium, 1934.

CHENOPODIUM MURALE
Mosaic of beet, Verplancke, Belgium, 1934.
Yellows of beet, Verplancke, Belgium, 1934.

CHENOPODIUM QUINOA
Mosaic of beet, Verplancke, Belgium, 1934.
Yellows of beet, Verplancke, Belgium, 1934.

SPINACEAE OLERACEAE
Yellow cucumber mosaic, Hoggan, Wisconsin, 1933. I from cucumber.
Fern leaf of tomato, Jones & Burnett, Washington, 1935, Same as cucumber mosaic virus.

NOTE: Severin, California reported curly top of sugar beet on prickly winter spinach, 1934, I.

SPINACEA sp.
Leaf curl, Wille, 1929, N.

SPINACEA OLERACEA
Mosaic of beet, Verplancke, Belgium, 1934.

SUALEA MARITIMA
Mosaic of beet, Verplancke, Belgium, 1934.
Yellows of beet, Verplancke, Belgium, 1934.

COMMELINACEAE

COMMELINA NUDIFLORA
Mosaic, Kunkel, Hawaii, 1932, N.

COMPOSITAE

ASTER sp.
New tomato disease, K. M. Smith, England, 1935.

ASTER (CALLISTEPHUS) SINENSIS
Mosaic of beet, Verplancke, Belgium, 1934.

CALENDULA sp.
Spotted wilt of tomato, K. M. Smith, England, 1935, N.
Cucumber virus 1, K. M. Smith, England, 1936.

CALENDULA OFFICINALIS
Virus disease, Bijl, South Africa, 1931, N.

CALLISTEPHUS CHINENSIS
Cucumber virus 1, K. M. Smith, England, 1936.

CENTAUREA CYANUS
Aster yellows, Kunkel, New York, 1928, I by *C. sexnotata.*

CINERARIA sp.
Spotted wilt of tomato, Ogilvie, England, 1935.

DAHLIA sp.
Stunt, Haskell, Georgia, 1928, N. Weiss reported a stunt the same year.
Virus disease, Brandenburg, Germany, 1928.

DAHLIA IMPERIALIS
Mosaic, Brierly, New York, 1933, I.

DAHLIA MAXONII
Mosaic, Brierly, New York, 1933, I.

DAHLIA VARIABILIS
Ring spot, Cannon, New Jersey, 1929, N.
Yellow ring spot, 1931.
Spotted wilt of tomato, K. M. Smith, England, 1932.

NOTE: Stunt and dwarf may be the same as mosaic.
Bigarrure of potato, Verplancke, Belgium, 1935.

DIMORPHOTHECA AURANTIACA
Tobacco mosaic, Grant, Wisconsin, 1934, I.

EMILIA FLAMMEA
Aster yellows, Kunkel, New York, 1931, L.

HELIANTHUS DEBILIS
Mosaic, Jagger, U. S. 1918, I from *C. sativus.*

HELICHRYSIUM BRACTEATUM
California aster yellow, Freitag & Severin, California, N. I from sugar beet by *E. tenellus.*

LACTUCA SATIVA
Spotted wilt of tomato, K. M. Smith, England, 1936.
Non-hearting, Ogilvie & Mulligan. 1933, Believed to be due to a mosaic virus.

NOTE: Severin, reported aster and celery yellows on prize head lettuce, California, 1934, I.

LACTUCA SCARIOLA
Mosaic, Curtis, Iowa, 1919, N.

MONOLOPIC CHENOPODIOIDES
Aster yellows, Kunkel, New York, 1931, I by *C. sexnotata.*

SONCHUS ARVENSIS
Mosaic of sugar beet, Mouravieff, Novienko, Russia, 1932.

STOKESIA sp.
Mosaic, Curtis, Iowa, 1923.

TAGETES ERECTA
Tobacco mosaic, Grant, Wiscounsin, 1934, I.

THELESPERMA HYBRIDUM
Yellows, Fukushi, Japan, 1931, I by insects.

TRICHOSANTHES CUCUMEROIDES
Mosaic, Kasai, Japan, 1924.

VERONIA CINEREA
Krul (or curl) & kroepoek (crinkle) of tobacco. Thung, Java, 1934.

VERONIA FASCICULATA
Mosaic, Curtis, Iowa, 1923, N.

ZINNIA sp.
New tomato disease, K. M. Smith, England, 1935.
Spotted wilt of tomato, K. M. Smith, England, 1936.

ZINNIA ELEGANS
Curly top of sugar beet, Severin and Freitag, California, 1933.
Bunchy top of tomato, McClean, South Africa, 1935, I.
Yellows, Severin, California, 1929, Same as aster yellows, celery yellows, lettuce yellows, etc.
Kroepock, Kerling, Sumatra, 1933, I. May be first record. Also on *Nicotiana tabacum*. A similar disease has been reported by Thung in Java or Sumatra in 1932.

CONVOLVULACEAE

ARGYREIA CUNEATA
Sandal spike. Suspected by Lushington, India, 1918.

CONVOLVULUS ARVENSIS
Virescence (teratology), Ryjkoff, Ukaraine, 1934.
Stolbur, Koratshevsky, Russia, 1935.

IPOMOEA LOBATA
Curly top of sugar beet, Freitag and Severin, California, 1933.
I from sugar beet by *E. tenellus*.

CRUCIFERAE

ARABIS sp.
Mosaic (Same as on *Cheiranthus cheiri*), K. M. Smith, England, 1935, N.

BARBAREA BARBAREA
Curly top of sugar beet, Severn, California. 1929, I.

BRASSICA ALBA

NOTE: Clayton (1930) reported mosaic on many cultivated Cruciferae, rutabagas, Brussels sprouts, cauliflower, white and black mustards, Chinese cabbage, turnips, rape, cabbage.

NOTE: K. M. Smith (1935) reported a mosaic on cabbage, Brussels sprouts and broccoli due to a virus from *Cheiranthus cheiri*. He also reported spotted wilt on cauliflower.

BRYONIA DIOICA
Marrow mosaic, Ogilvie, England, 1935.

CHEIRANTHUS CHIERI
Mosaic color changes, K. M. Smith, England, 1935, N. Recorded as wallflower.

HESPERIS MATRONALIS
Mosaic (same as on *Cheiranthus cheiri*), K. M. Smith, England, 1935, N.

LONDON MUSTARD
California aster yellows, Severin, California, 1934, I.

MATHIOLA sp.
Spotted wilt of tomato, K. M. Smith, England, 1935, N.

TURNIP
Mosaic of beet, Verplancke, Belgium, 1934.

ROBINIA PSEUDOACACIA
Rosette or broom, Orton & Rand, U. S. 1914, N.
Mosaic, Dana & McWhorter, Oregon, 1932, N.

CORNACEAE

CORNUS MAS
Mosaic, Atanasoff, Bulgaria, 1935.

CUCURBITACEAE

BENINCASA CERIFERA
Ring spot of tobacco, U. S. 1925, I from *C. cucumis*.

CUCUMIS MELO vars. CATALOUPENSIS, INODORUS, RETICULATUS.
Curly top of sugar beet, Severin & Henderson. California, I.

NOTE: Dana (Oregon 1934) reported curly top of sugar beet on many cultivated varieties, such as melons, squash, cantaloup, etc.

CUCUMIS SATIVUS
Delphinium virus, Valleau, Kentucky, 1932.
Yellow mosaic, Hoggan, Wisconsin, 1935, N.
Mild mosaic, Hoggan, Wisconsin, 1935, N.

NOTE: Ainsworth (England 1934) reported that cucumber mosaic and white pickel mosaic were synonyms of yellow cucumber mosaic.

MOMORDICA CHARANTIA
Mosaic or white pickel, Jagger, U. S. 1910, I from *C. sativus*.

DIOSCORACEAE

DIOSCOREA (Cultivated)
Mosaic, Roque, Puerto Rico, 1936, First published record.

EUPHORBIACEAE

EUPHORBIA PRESLII
Mosaic, Curtis, Iowa, 1923, N.

MANIHOT APII
Mosaic, Dade, Gold Coast, 1926, N.
Mosaic, Kufferath & Ghésquiere, Belgium Congo, 1932, N.

NOTE: These mosaics may be different.

MANIHOT UTILISSIMA
Mosaic, Kufferath & Ghésquiere, Belgium Congo, 1932, N.

GERANACEAE

OXALIS STRICTA
Curly top of sugar beet, Starrett, 1929, I by *E. tenellus.*

PELARGONIUM sp.
Aucuba mosaic, Blattny, Czechoslovakia, 1933.
Interveinal mosaic, Blattny, Czechoslovakia, 1933.
Spotted wilt of tomato, Holmes Smith, England.

PELARGONIUM HEDERACEUM
Leaf curl or mosaic, Verplancke, Belgium, 1932.

PELARGONIUM ZONALE
Periclinal variegations, Funaoka, 1924.
Leaf curl or mosaic, Verplancke, Belgium, 1932.

GESNERIACEAE

DIDYMOCARPUS HORSFIELDII
Aster yellows, Kunkel, New York, 1931, I by *C. sexnotata.*

GLOXINIA sp.
Spotted wilt of tomato, K. M. Smith, England, 1935, N.

GRAMINEAE

AVENA SATIVA
Streak of sugar cane, Storey, South Africa, 1925, N.

ECHINOCHLOA CRUS GALLI sub sp. *colona,* var. *edulis*
Dwarf or rice, Fukushi, 1934, I.

ELEUSINE CORACANA
Streak of sugar cane, Storey, South Africa, 1925, I.

EUCHLAENA MEXICANA
Streak of sugar cane, Storey, South Africa, 1925, I.

HORDEUM sp.
Rosette, Jones, Egypt, 1935, N.

IMPERATA ARUNDINACEAE
Streak of sugar cane, Storey, South Africa, 1925, N.

MISCANTHUS SINENSIS
Sugar cane mosaic, Brandes & Klaphaak, U. S. 1923, I.

ORYZA SATIVA

Dwarf. Takada said that this disease was known as early 1883 and that it was first described in 1890.

PANICUM MILLIACEUM

Streak of sugar cane, Storey, South Africa, 1925, N.

PANICUM SANGUINALE

Sugar cane mosaic, Cottrell-Dormer, Auustralia, 1926.

PASPALUM BOSCIANUM

Sugar cane mosaic, Brandes & Klaphaak, U. S. 1923, I.

PHYLLOSTACHYS PUBESCENS

Sugar cane mosaic, Brandes & Klaphaak, U. S. 1923, N.

SACCHARUM OFFICINARUM

NOTE: Storey and McClean (1930) demonstrated that the viruses of streak of maize and cane were not identical.

NOTE: Storey, 1935 reported a mosaic on Agual cane in Natal, which he believed to be different from the common cane mosaic.

SETARIA AUREA

Sugar cane mosaic, Cottrell-Dormer, Australia, 1926.

SETARIA SULCATA

Streak of sugar cane, Fuller, South Africa, 1901. Not understood. Reported as a virus diseases by Storey & McClean 1930.

SETARIA VERTICILATA

Mosaic, Storey, South Africa, 1924, N.

SORGHUM sp.

Streak of sugar cane, Fuller, 1901, N. Not understood as a virus disease.

Transvaal mosaic, Storey, South Africa, 1929, N.

TRAGUS RACEMOSUS

Streak of sugar cane, South Africa, 1930, N.

VALOTA INSULARIS

Mosaic, Brandes, Hawaii, 1928.

ZEA MAYS

NOTE: Storey (1931) reported a stripe in East Africa. The vector is *Peregrinus maidis.*

NOTE: Ocfemia (1931) reported a disease of corn in the Philippine Islands which resembled the Fiji disease of sugar cane.

NOTE: Storey and McClean, 1930, demonstrated that the viruses of streak disease of maize and cane were not identical.

Transvaal mosaic. Storey, South Africa, 1929, N. I. This disdoes not attack sugar cane but it is transmitted by *Aphis maidis.*

IRIDACEAE

IRIS IMPERATI
Mosaic, Ogilvie, U. S. 1930, N. Observed in greenhouses.

IRIS TINGINGITANA
Mosaic, Ogilvie, U. S. 1930, N. Observed in greenhouses.
Mosaic or stripe, K. M. Smith, England, 1936.

IRIS XIPHIUM
Mosaic or stripe, K. M. Smith, England, 1936.

IRIS XIPHIUM HYBRIDUM
Mosaic or stripe, K. M. Smith, England, 1936.

IRIS XIPHONOIDES
Mosaic or stripe, K. M. Smith, England, 1936.

LABIATAE

COLEUS BLUMEI

NOTE: It has been suggested that some of the variegations in this and other species may be due to a virus but there is no proof.

GLECHOMA HEDERACEA
Periclinal variegations. Funaoka, Japan, 1924.

NEPETA CATARIA
Mosaic from cucumber, Doolittle & Walker, U. S. 1925.
Ring spot of tobacco, Doolittle & Walker, Wisconsin, 1926. I from *C. sativus.*

LEGUMINOSACEAE

ARACHIS HYPOGEA

NOTE: Hayes reported three types of rosette in Gambia.

Pale dwarf (juvenille disease), Hartley, Java, 1927. Resembles a virus disease but probably due to other causes.
Clump disease, Sundaranaman, India, 1928, N. Similar to the rosette of South Africa.

CANAVALIA ENSIFORMIS
Mosaic, Hopkins, South Rhodosia, N. 1931. N.

CANAVALIA LINEATUA (*C. obtusifolia*)
Mosaic, Ogilvie, 1927.

CYTISSUS HIRSUTUS
Chlorosis Baur, Germany, I from *Laburnum vulgare.*

DOLICHUS BIFLORUS
Ring spot of tobacco, Wingard, Virginia, 1928. I from tobacco and back.

DOLICHOS LABLAB
Mosaic, South Rhodosia, 1931, N.

DOLICHOS LUPINIFLORUS
Mosaic, Hopkins, South Rhodosia, 1933, N.

LATHYRUS ODORATUS
Mosaic, Doolittle & Jones, U. S. 1925. I from *Trifolium pratense.*
Sore shin, Chamberlain, Australia, 1935.

LUPIN sp.
Cucumber 1, K. M. Smith, England, 1936.

LUPINUS ANGUSTIFOLIUS
Sore shin, Chamberlain, Australia, 1935. Also attacks sweet pea, garden pea and broad bean.

LUPINUS LUTEUS
Mosaic, Merkel, Germany, 1929.
Chlorosis, Scholz, Germany, 1932. Known for many years. Not proved to be a virus.

NOTE: Sore shin which appears to be the same has been reported in Australia. Also occurs on *L. angustifolius* in Germany, Kohler, 1935.

LUPINUS POLYPHYLLUS
Spotted wilt of tomato. Ogilvie, England, 1935.

MALCONIA MARITIMA
Aster yellows, Kunkel, New York, 1931. I by *C. sexnotata.*

MEDICAGO sp.
Witches' broom, Edwards, Australia, 1935. Commonly known as spindle shoot, mistletoe, bunchy toe and kurrajong.

MEDICAGO LUPULINA
Mosaic, Harrison, New York, 1935. I from *Phaseolus vulgaris* by Aphid.

MELILOTUS sp.
New virus of the ring spot type, Henderson, 1934. It attacks tobacco.
Mosaic, Elliott. Arkansas. 1921. Inoculations from *M. alba* and *T. pratense.*

MELILOTUS ALBA
Ring spot of tobacco. Henderson & Wingard, Virginia, 1931, N.
Mosaic, Harrison, New York, 1935. I from *Phaseolus vulgaris* by *Aphis* sp.

PHASEOLUS ACONITIFOLIUS
Mosaic, Reddick & Stewart, New York, 1919.

PHASEOLUS ATROPURPUREA
Curly top of sugar beet, Severin & Henderson, California, 1928.

PHASEOLUS LUNATUS

Mosaic, McClintock, Virginia, 1917.

NOTE: A bean mosaic of some kind was reported from Russia in 1899. Clinton reported a chlorosis of lima bean from Conn. in 1908.

PHASEOLUS SATIVUS

Mosaic, Severin & Henderson, California, 1928.

PHASEOLUS VILLOSA

Curly top of sugar beet, Severin and Henderson, California, 1928.

PHASEOLUS VULGARIS

Yellows, Smith & Barker, Haiti, 1930. Apparently caused by *Empoasca* sp. but not definitely settled.

Yellow mosaic, Pierce, Wisconsin, 1934, N. He reported that the host range was very nearly that of the common bean mosaic virus.

Sore shin, Chamberlain, Australia, 1935. I from Lupinus to broad bean.

NOTE: Zaumeyer (1934) reported that the mosaic of the pea, alsike clover, white sweet clover, alfalfa and sweet pea were transmitted to *P. vulgaris*. Red clover mosaic was not transmitted to these hosts.

Yellow mosaic. Harrison, New York, from alsike clover, red clover, white sweet clover and from black medick, 1935.

Mosaic, Harrison, New York, I from white sweet clover, alfalfa and bean, 1935.

Common bean virus No. 1, tobacco mosaic virus No. 1 and ring spot of tobacco virus, Price, 1934.

Alfalfa mosaic virus No. 2, Price, 1934.

Yellow bean virus No. 2, Price, 1934.

Johnson's tobacco mosaic virus No. 1, Stanley, New Jersey, 1936.

Common bean mosaic virus 1, Pierce, Idaho, 1935.

Yellow bean virus No. 2, Pierce, Idaho, 1935.

Enation pea mosaic virus (pea virus 2), Pierce, Idaho, 1935.

Common pea mosaic virus (pea virus 2), Pierce, Idaho, 1935.

Common soy bean mosaic virus 1, Pierce, Idaho, 1935.

Broad bean local-lesion virus obtained from red clover, Pierce, Idaho, 1935.

PISUM SATIVUM

Mosaic, Blaringham, Canada, 1922. I from *P. sativus* to *T. pratense L. odoratus* by *Doolittle & Jones*, 1925.

Sore shin, Chamberlain, Australia, 1935, I from *Lupinus augustifolius*.

PISUM sp.

Mosaic, McClintock, Virginia, 1917, I from *Arachis hypogea*.

Mosaic, Böning, Germany 1927, I from *Vicia faba*.

RADICULATA SYLVESTRIS

Mosaic, McKinney, Canary Islands, 1928, N.

TRIFOLIUM HYBRIDUM

Mosaic, Harrison, 1935. I by Aphis from *Phaseolus vulgaris.*
Mosaic, Dickson, Canada, 1922, I from *T. pratense.* Böning reported a mosaic from Germany, transmitted from *Vicia faba.* Harrison of New York (1935) reported transmission of mosaic from *Phaseolus vulgaris* by Aphis.

TRIFOLIUM PRATENSE

Mosaic, Elliott, Arkansas, 1924, N. Observed first in 1917. Transmitted from *T. pratense* by Dickson, Canada, 1922.

TRIFOLIUM REPENS

Mosaic, Elliott. Arkansas, 1921, I from *M. alba* and *T. pratense.*

VICIA FABA

Mosaic, Elliott, Arkansas, 1921, I from *M. alba* and *T. pratense.* A mosaic which is transmissible to peas, crimson clover and red clover was reported from Germany 1927 by Böning.
Curly top of sugar beet, Severin, California, 1928, N.

VICIA FABA MAJOR

Mosaic of beet, Verplancke, Belgium, 1934.

VIGNA SINENSIS

New virus disease of tomato, K. M. Smith, England, 1935.
Necrosis disease of tobacco, K. M. Smith & Bald, England, 1935.
Celery virus, 1, Wellman, Florida, 1934.

LILIACEAE

ALLIUM ASCOLONICUM

Yellow dwarf of onion, Henderson, Iowa, 1935.

LILIUM AURATUM

A virus disease, Pape, Germany, 1934.
Rosette, K. M. Smith, England, 1936.

LILIUM CANDIDUM

Mosaic, Woods, U. S. 1927, N. Cause not known. He also reported Bermuda lily disease on *L. harrisii, L. aurantum* and *L. candidum* in 1897.

LILIUM HARRISII

Mosaic, 3 types, Ogilvie, New York, 1930.

LILIUM LONGIFLORUM var. *eximum*

Yellow flat, Ogilvie, 1928, N. May better be called rosette.
Stunt, Pape, Germany, this record included the varieties *erabu* and *formosum.* 1934.

LILIUM LONGIFLORUM var. *giganteum.*

Rosette, K. M. Smith, England, 1936.

TULIP sp.

Clotting is an expression of full breaking in certain varieties. Mc Kenny Hughes, England, 1934.
Falling disease, Pinkhof, Holland, Cause unknown.

LOBELIACEAE (See Campanulaceae)

MALVACEAE

ALTHAEA FICIFOLIA
Chlorosis, Lindemuth, Graft from *Abutilon striatum* var. *Thompsonii.*

ALTHAEA NARBONENSIS
Variegations, Lindemuth, Germany, 1902. Transmitted from Abutilon by grafting.

ALTHAEA ROSEA
Chlorosis, Baur, Germany, from *Abutilon striatum* var. *Thompsonii* by grafting.

ABUTILON ARBOREUM
Mosaic, Baur & Lindemuth, Germany, I by graft.

ABUTILON AVICENNAE
Mosaic, Baur & Lindemuth, Germany, I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON DARWINI
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON ESCULENTUM
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON HYBRIDUM
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON INDICUM
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON INEQUALE
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON MEGAPOTOMICUM
Mosaic, Baur & Lindemuth, Germany. I by graft from *A. striatum* var. *Thompsonii.*

ABUTILON SELLOWAINANUM
Mosaic, Baur & Lindemuth, Germany. I by graft.

ABUTILON VENOSUM
Mosaic, Baur & Lindemuth, Germany, I by graft from *A. striatum* var. *Thompsonii.*

GOSSYPIUM sp.

Azerbijan, Verderevsky. Russia, 1935.

NOTE: Leaf curl of cotton appears to have been reported first from Nigeria in 1912 by Farquarson. It was described in 1926 by Jones & Mason. It is especially prevalent on *G. peruvianum* and *G. vitifolium*.

NOTE: Hertsch (1927) reported two types of infectious chlorosis in *Malvaceae*, A & B.

"A" on ABUTILON THOMPSONII var. Thompsonii, A. DWARINI, A. TESSETATUM & A. STRIATUM.

"B" appeared spontaneously on T. DWARINI & LAVATERA ARBOREA.

"A" attacks A. INDICUM & SIDA NAPAEA very severely. Less severe on A. SELLOWAIANUM, MALVA BOREALIS, M. CRISPA, ALTHAEA OFFICINALIS and A. STRIATUM.

He also reported an infectious chlorosis on *Euonymous, Jasminum, Fraxinus, Castanes* and *Laburnum*.

Mosaic, Berry, Georgia, 1918, N.

HIBISCUS ESCULENTUS
Leaf curl of cotton, Farquarson, Nigeria, 1912, N.

HIBISCUS SABDARIFFA
Leaf curl of cotton, Kirkpatrick, Sudan, 1931.

MALVA SYLVESTRIS
Chlorosis, Lindemuth, Graft from *Abutilon striatum* var. *Thompsonii*.

SIDA ABUTILON
Variegations, Davis, Missouri, 1929.

SIDA MOLLIS
Chlorosis, Lindemuth, Graft from *Abutilon striatum* var. *Thompsonii*.

SIDALCEA CANDIDA
Chlorosis, Lindemuth, Graft from *Abutilon striatum* var. *Thompsonii*.

MARTYNIACEAE

PROBOSCIDEA LOUSIANA
Mosaic of tobacco, Jones & Burnett, Washington, 1933.

MELIACEAE

CIPADESSA FRUCTICOSA
Sandal spike, Suspected by Lushington, India, 1918. Also mentioned by Iyengar in 1935. Confirmed by Varadaraja Iyengar & Rangaswami (maunscript) 1935.

MORACEAE

FICUS sp.
Mosaic, Condit & Horne, California, 1933.

FICUS PARCELLI
Variegations resembling mosaic. F. F. Smith, Missouri, 1926.

FICUS TSIELA
Spike similar to Sandal, Lushington, India, 1916.

HUMULUS sp.
Squirt mosaic, Blattny, Czechoslovakia, 1927, N.

MUSACEAE

MUSA sp. (banana)
Mosaic, Ogilvie, Bermuda, 1917 and by Roque (not published) in Puerto Rico in 1934.

MUSA BANKSII
Bunchy top, Magee, Australia, 1927. He says that all species are attacked.

MUSA CAVENDISHII
Bunchy top, Magee, Australia, 1927.

MUSA SAPIENTUM
Bunchy top, Jones, Egypt, 1935.

MUSA TEXTILIS
Bunchy top, Ocfemia, Philippine Islands, 1926.
Mosaic (suspected), Calinisan, Philippine Islands, 1934.

NOTE: The bunchy top *M. textilis* and of bananas appear to be due to two distinct viruses.

NYCTAGINACEAE

BOUGAINVILLEA GLABRA
Chlorosis, F. F. Smith, Missouri, 1926.

OLEACEAE

FRAXINUS sp.
Mosaic, Atanasoff, Bulgaria, 1935.

JASMINUM OFFICINALE
Infectious chlorosis, John Lawrence, England, 1715. See Orton in Phytopathology 14:198, 199, 1924.

JASMINUM REVOLUTA
Chlorosis from *J. officinale*, Masters, England, 1869.

SYRINGA sp.
Mosaic. Atanasoff. Bulgaria. 1935.

ONARGRACEAE

FUCHSIA MAGELLANICA
Mosaic, McKinney, Canary Islands, 1929, N.

PAPAVERACEAE

ESCHSCHOLZIA CALIFORNICA
Curly top of sugar beet, Severin & Freitag, California, 1934. I.

PAPAVER NUDICAULE

Curly top of sugar beet, Freitag & Severin, California, 1933. I from sugar beet by *E. tenellus*.

Spotted wilt of tomato, Holmes Smith, England, 1934. N.

PHYTOLACCACEAE

PHYTOLACCA DECANDRA

Cucumber mosaic, Doolittle & Walker, 1923.

Yellow mosaic, Hoggan, Wisconsin, 1935. I from cucumber.

Mild mosaic, Hoggan, Wisconsin, 1935. I from cucumber. Produces local chlorotic symptoms.

Fern leaf of tomato, Jones & Burnett, Washington, 1935. Same as cucumber mosaic.

PITTOSPORACEAE

PITTOSPORIUM TOBIRA

Variegations, F. F. Smith, Missouri, 1926.

PLANTAGINACEAE

PLANTAGO LANCEOLATA

Mosaic of beet, Verplancke, Belgium, I. 1932.

Yellows of beet, Verplancke, Belgium, I. 1932.

PLANTAGO MAJOR

Celery yellows, Severin, California, 1928, N. Probably same as aster yellows.

California aster yellows, and celery yellows, Severin, California, 1934, I.

PLUMBAGINACEAE

ARMERIA ALPINA

Ring spot of tobacco, Wingard, Virginia, 1928. I from tobacco and back.

LIMONIUM SUWORWI

Ring spot of tobacco, Wingard, Virginia, 1928, I from tobacco and back.

POLYGONACEAE

POLYGUNUM HYDROPIPER

Ring spot of tobacco, Wingard, Virginia, 1928, I.

RUMEX ACETOSA

Leaf curl, Willie, Germany, 1929, N.

RUMEX BRITANICA

Mosaic, Fernow, New York, 1923, N.

RUMEX CRISPUS

Potato mosaic, van der Meulen, Holland, 1928.

RUMEX LANCEOLATA

Mosaic, Grainger & Cockerham, England, 1930, N.

Mottling, Green, England, 1930, N.

RUMEX OBTUSIFOLIUS
Chlorosis & mosaic, Grainger & Cockerham, England, 1930, N.

RUMEX SCUTATUS
Mosaic & yellows of beet, Verplancke, Belgium, I.

PORTULACACEAE

CALANDRINA MANZIESII
Curly top of sugar beet, Carsner & Stahl, California, 1924, I from sugar beet.

PRIMULACEAE

POLYANTHUS sp.
Cucumber virus 1, K. M. Smith, England, 1936.

PRIMULA OBCONICA
Cucumber virus 1, K. M. Smith, England, 1936.

PRIMULA SINENSIS
Spotted wilt of tomato, Ogilvie, 1935, I from sugar beet by *E. tenellus.*
Cucumber virus 1, K. M. Smith, England, 1936.

RANUNCULACEAE

(hybrid)

AQUILEGIA ep.
Mosaic, F. F. Smith, Missouri, 1926. I.

DELPHINIUM sp.
A virus disease, Valleau, Kentucky. 1932.
Yellows, Richards. Utah, 1928. Not proved to be a virus disease.
Disease resembling ring spot of tobacco, Valleau, Kentucky, 1928.
Cucumber virus 1, K. M. Smith, England, 1936.

NASTURTIUM OFFICINALE
Curly top of sugar beet, Freitag & Severin, California, 1933, I from sugar beet by *E. tenellus.*

RANUNCULUS ASIATICUS
Curly top of sugar beet, Severin & Freitag, California, 1934, N.

RHAMNACEAE

SCUTIA INDICA
Spike of sandal. No data.

ZIZIPHUS OENOPHIA
Spike of Sandal suspected by Lushington, India, 1918. Iyengar reported it in 1935. Confirmed by Varadaraja, Iyengar & Rangaswami (manuscript) 1935.

ROSACEAE

NAPOLEON CHERRY
Mottle leaf, Zeller, Oregon, 1935. Not definitely proved to be virus disease.

PRUNUS AVIUM
Mosaic, Christoff, Bulgaria, 1934.

PRUNUS CERASUS
Mosaic, Christoff, Bulgaria, 1934.

PRUNUS DIVARICATA
Mosaic, Christoff, Bulgaria, 1934.

PRUNUS INTERSTITIA
Mosaic, Christoff, Bulgaria, 1934.
Mosaic or yellows with green veins, Blattny, Czechoslovakia, 1930, N.

PRUNUS MAHALEB
Mosaic, Christoff, Bulgaria, 1934.

PRUNUS PERSICA
Rosette, E. F. Smith, Georgia, 1888, N. Successfully transmitted by grafting peach plum, cherry and almond, McClintock, 1923.
Spike of peach, similar to spike of Sandal, Howard, India, 1919.
Virus from plum, Valleau, Kentucky, 1932. Transmitted from plum to peach by budding.
Ring spot like disease, Valleau, Kentucky, 1932. Transmitted from *P. salicina* by budding.

NOTE: Kunkel (1936) said that Peach yellows and little peach were related but that rosette was due to a very different virus.

PRUNUS SALICINA
Ring spot like disease. Valleau, Kentucky, 1932. Transmitted by budding.

NOTE: Rietsema (1930) reported a virosis on cherry, plum and peach. Holland.

PRUNUS SPINOSA
Mosaic, Christoff, Bulgaria, 1934.

PYRUS MALUS
Crinkle, Robbins, Wisconsin, 1919.
Mosaic, Blodgett, New York, 1923, N.
Ringspot like disease, Valleau, Kentucky, 1932. Virus character not demonstrated.
Bitter pit. This disease has been known in many countries and for many years. Atanastoff (1934) placed in the virus group. The virus character has not been demonstrated to the satisfaction of all students of the subject.
Virus disease of apple, pear and quince. Christoff, Bulgaria. 1934.

ROSA sp.
Mosaic, Weiss & McWhorter, Washington & Oregon, 1930. Christoff, Bulgaria. 1934.
Die back & wilt, Grieve, Australia, 1931.
Mosaic, White, New Jersey, 1928.

ROSA GYMNOCARPA
Mosaic, McWhorter, Oregon, 1931, N.

ROSA MULTIFLORA
Chlorosis, Weiss & McWhorter, Washington & Oregon, 1930. Transmitted by grafting.

ROSA ODORATA
Chlorosis, Weiss & McWhorter, Washington & Oregon, 1930.

ROSA RUBINOSA
Dwarf of loganberry, Zeller, Oregon, 1925. Same as on Loganberry.
Wilt or die back, Grieve, Australia, 1931, N. I.

RUBUS sp.
Yellows of raspberry was reported by Stewart of New York in 1902.
Mosaic on Loganberry, Zeller, Oregon, 1924.
Fern leaf and Witches' broom, Zundel. Pennsylvania. 1931. N.
English mosaic of red raspberry, Zeller, Oregon, Washington and Idaho. 1936. Imported from England.

RUBUS IDAEUS var. *strigosus*
Mosaic & curl, Zeller, Oregon, 1923.

RUBUS INNOMINATUS
Mosaic, Wilcox, 1926.

RUBUS LACINIATUS
Mosaic, Zeller, Oregon, 1923.

RUBUS NEGLECTUS
Mosaic, Zeller, Oregon, 1923.

RUBUS OCCIDENTALIS var. *leucodermis*
Mosaic, Zeller, Oregon, 1923.

RUBUS PHOENICOLASIUS
Mosaic, Zeller, Oregon, 1923.

SORBUS ACUPARIA
Chlorosis, Davis, Missouri, 1929.

SPIRAEA DOUGLASSII
Virus disease, Zeller, Oregon, 1931, Same as on *Holodiscus discolor*.

RUTACEAE

CITRUS sp.

NOTE: Atanasoff (1935) said that mal seco is same as Tarbut's infectious chlorosis.

NOTE: Bitancourt (1935) of Brazil believes psorosis, leprosis, ring blotch and zonate chlorosis due to viruses.

SALICACEAE

POPULUS BALSAMIFERA
Mosaic, Atanasoff, Bulgaria, 1934.

SANTALACEAE

SANTALUM ALBUM
Spike disease, Butler (1903) suggested that this disease was due to a virus. Rao & Gopola Iyengar (1934) reported two strains, rosette or old type and pendulous or new type. K. M. Smith (1935) says that this disease was first reported from Coorg, India, in 1899.
Leaf curl mosaic, Vankata Rao, 1933.

SAPINDACEAE

ACER NEGUNDO
Periclinal variegations, Funaoka, 1924.
Mosaic, Atanasoff, Bulgaria, 1935.

DODONAEA VISCOSA
Spike of Sandal, Suggested by Lushington, India, 1918. Also mentioned by Iyengar 1935.

SCROPHULARIACEAE

MIMULUS sp.
New disease of tomato, K. M. Smith, England, 1935.

SOLANACEAE

ATROPA BELLADONNA
Crinkle, Quanjer, Holland, 1923, I from tobacco.
Virescence (teratology), Ryjkoff, Ukraine, 1934.
Stolbur, Koratshevsky, Russia, 1935.

BROWALLIA MAJOR
Spotted wilt of tomato, Ogilvie, England, 1935.

BROWALLIA SPECIOSA MAJOR
Spotted wilt of tomato, Ogilvie, England, 1932.

CAPSICUM sp.
Yellow mosaic of tomato, Stover & Vermillion, Ohio, 1932, N.

CAPSICUM ANNUUM
Mosaic, Lewis, Georgia, 1919, N.
Curly top of sugar beet, Severin, California, 1927, N.
Potato mosaic, J. Henderson Smith, England, 1928. I from *L. esculentum.*
Infectious chlorosis, Ikeno, Japan, 1930.
Psyllid yellows, 1930. Not proved to be a virus.
Mosaic, Johnson No. 1. Ainsworth, England, 1933.
Leafroll, Dykstra, 1933, I from potato by *M. Persicae.*

Glasshouse streak (identical with tobacco mosaic), Ainsworth, England, 1933.
Yellow mosaic, Stover & Vermillion, Ohio, 1933, I from tomato.
Curly top of sugar beet, Dana, Oregon, 1934. Slight symptoms.
Potato calico, Porter, California, 1935.
Bunchy top of tomato, McClean, South Africa, 1935. Transmissible by inoculation but not readily.
Bigarrure of potato, Verplancke, Belgium, 1935.

CAPSICUM GROSSUM
Celery virus 1, Wellman, Florida, 1934, I.

CESTRUM PARQUI
Virus disease, Trotter, Italy, 1935.

DATURA sp.
Virescens (teratology), Ryjkoff, Ukaraine, 1934.

DATURA STRAMONIUM
Virus disease, Verplancke, Belgium, 1930, Transmitted from *Araceae.*
Coarse etch, Johnson, Kentucky, 1930, I from tobacco.
Virus disease, Moore, South Africa, 1932, I. May be same as spotted wilt of tomato. Attacks *N. physaloides,* and *Physalis* sp.
Yellows, Verplancke, Belgium, 1932, I.
Spotted wilt of tomato, K. M. Smith, England, 1932.
Interveinal mosaic of potato, Clinch, Ireland, 1933, I.
Simple mosaic of potato, Clinch, Ireland, 1933, I.
Virus A of potato, Clinch, Ireland, 1933.
Streak of potato, Clinch, Ireland, 1933.
Leafroll of tomato, Dykstra, 1933, I from tomato by *M. persicae.*
Necrotic virus disease. Same as on potatoes.
Necrotic, Schultz & Raleigh, 1933. I from British Queen potato.
Mosaic of beet, Verplancke, Belgium, 1934.
Latent virus of potato, Jones & Burnett, Washington, 1934.
Yellow mosaic of cucumber, Ainsworth, England, 1934.
Potato calico, Porter, California, 1935.
New tomato disease, K. M. Smith, England, 1935.
Necrotic disease of tobacco, K. M. Smith & Bald, England, 1935.
Streak from tomato, K. M. Smith, England, 1935. I from tomato. Yellow variation of same.
Stolbur, Koratshevsky, Russia, 1935.
Bigarrure of potato, Verplancke, Belgium, 1935.

DATURA TATULA
Bigarrure of potato, Verplancke, Belgium, 1935.

HYOSCYAMUS sp.
Yellows or mosaic, Allard, D. C. 1912, I from tobacco.

HYOSCYAMUS NIGER

Crinkle, Holland, 1923, I from *S. tuberosum.*

Virus Y potato, K. M. Smith, England, 1931, I from *S. tuberosum.*

Latent virus of potato, Jones & Burnett, Washington, 1934.

Mosaic of tobacco, Jones & Burnett, Washington, 1934.

Yellow mosaic of cucumber, Ainsworth, England, 1934.

Mosaic of beet, Verplancke, Belgium, 1934.

Yellows of beet, Verplancke, Belgium, 1934.

Streak of tomato, K. M. Smith, England, 1935, I from tomato.

Bigarrure of potato, Verplancke, Belgium, 1935.

LYCOPERSICON ESCULENTUM

Yellows, western yellows, yellow blight etc, R. E. Smith, California, 1906, N. It was reported as due to the virus of curly top of sugar beet by McKay & Dykstra in 1927.

Filiform leaf, C. R. Orton, Pennsylvania, 1918, N. Known much earlier.

Fern leaf, Mogendorff, 1930, Known much earlier. Caused by cucumber virus 1.

Streak which has been reported as due to a combination of tobacco and potato mosaic viruses. Vanderpool published a paper (1926) in which he reported that the disease was due to a mixture of potato and tomato mosaic viruses. In a marginal note on a reprint sent to the compiler he says it was shown to be a latent potato mosaic virus. Jarrett, England, 1930 reported a streak due to a single virus. Valleau & Johnson, Kentucky, 1930 reported streak caused by (1) mixed viruses belonging to the true tobacco mosaic virus group, (2) three strains of true tobacco mosaic viruses plus the healthy potato virus, (3) three strains of cucumber mosaic viruses plus the healthy potato virus and (4) three strains of etch virus plus the healthy potato virus.

Leaf curl, Stephanoff. Astrakhan, 1930.

Streak or die back, Shapovalow, California, 1933. Different from the combination virus streak.

Mosaic, Fernow, New York, 1923, I from tobacco. I (1925) from *N. glutinosum.* Potato mosaic, 1923. Mosaic from Apparently healthy potatoes by Fernow, 1925.

Rugose mosaic, Burnett & Jones. Washington, 1931, I from potato.

Mosaic (Johnson's virus No. 1) Ainsworth, England, 1933.

Yellow mosaic of cucumber, Hoggan, Wisconsin, 1935. I from cucumber.

Yellow mosaic of tomato, Stover & Vermillion, Ohio, 1933, I.

Celery mosaic, Doolittle, Florida, 1931. Probably same as cucumber mosaic.

Spot necrosis, Burnett & Jones, Washington, 1931. Is caused by veinbanding and potato latent virus. Same as rugose mosaic of potato.

Latent virus, Burnett & Jones, Washington, 1931. I from potato.

Crinkle, Burnett & Jones, Washington, 1931. I from potato.

Leafroll, Burnett & Jones, Washington, 1931, I from potato.

Spindle tuber, Burnett & Jones, Washington, 1931, I from potato.

Delphinium virus, Valleau, Kentucky, 1932, I.

Veinbanding, Burnett & Jones, Washington, 1931. I from potato. Symptoms similar to symptoms described by Schultz as crinkle in 1929. Dykstra consider it a component of tomato mosaic.

Yellow spots, Jensen, New Jersey, 1933.

Big bud, Samuel, Bald & Eardly, Australia, 1933. Probably same as a disease reported by Cobb in 1902. Also known as bunchy top but not the same as the bunchy top of South Africa.

New virus disease, K. M. Smith, England, 1935. Also attacks *N. tabacum, N. glutinosum, N. langsdorffii, Datura stramonium, S. tuberosum,* (Arran Victory), *Vigna sinensis, Mimulus* sp. *Aster* sp. and *Zinnia* sp.

Streak (green), K. M. Smith, England, 1935. Same as tomato stripe of Ainsworth et al, 1934. When this virus was grown on white Burly tobacco, a yellow strain appeared.

Necrotic virus disease of tobacco, K. M. Smith & Bald, England, 1935.

New virus disease of tomato and *V. sinensis,* K. M. Smith, England, 1935.

Virus diseases 1, 2, 3, K. M. Smith, England, 1935, N.

Virus disease, Moore, South Africa, 1932, May be same as spotted wilt.

Virescence (teratology), Ryjkoff, Ukaraine, 1933. Also on *N. tabacum, Convolvulus arvensis, Atropa belladonna* and *Datura* spp.

NOTE: Bunchy top of Australia is different from bunchy top of South Africa. See big bud.

Necrosis, Schultz & Raleigh. I from British Queen.

Leafroll, 1923, I from tomato and *D. tatula* by *M. persicae.*

Calico of potato, Porter, California, 1935.

Huissen, Van Schreven, Holland, 1935.

Stolbur, Koratskevsky, Russia, 1935. This disease also attacks *Atropa belladonna, Datura stramonium, Nicotina tabacum* and *Convolvulus arvensis.* Same as fruit woodiness.

NOTE: A new tomato disease reported by K. M. Smith, June 1935 was proved later by Ainsworth to be due to ordinary tomato virus.

CURRANT TOMATO—Latin name not given.

Bunchy top of tomato, McClean, South Africa, 1935, I.

NICANDRA PHYSALOIDES

Mosaic (potato and tobacco), Fernow, New York, 1923.
Mosaic from apparently healthy potato, Fernow, New York, 1925.
Mosaic from *N. tabacum, N. glutinosum, N. rustica, D. stra-* and *L. esculentum.*
Crinkle of potato, Clinch, Ireland, 1933. I.
Interveinal mosaic of potato, Clinch, Ireland, 1933, I.
Bunchy top of tomato, McClean, South Africa, 1935, I.
Latent virus of potato, Jones & Burnett, Washington, 1935.
Tobacco mosaic, Jones & Burnett, Washington, 1935.
Bigarrure of potato, Verplancke, Belgium, 1935.

NICOTIANA (many species)

Spotted wilt of tomato, Ogilvie, England, 1935. Also by K. M. Smith.

NICOTIANA ACUMINATA

Curly top of sugar beet, Freitag & Severin, California, 1933, I from sugar beet by *E. tenellus.*

NICOTIANA BIGELOVII (*N. multivalis* & *N. quadrivalis* are considered as varieties.)

Tobacco mosaic, Holmes, New Jersey, 1934.

NICOTIANA CLEVELANDI

Tobacco mosaic, Holmes, New York, 1932.

NICOTIANA FORTGETIANA

Mosaic, Allard, D. C. 1914.

NICOTIANA GLAUCA

Mild yellow mosaic, McKinney, D. C. 1931. Does not attack *L. esculentum.*
Severe yellow mosaic, McKinney, D. C. 1931. Attacks *L. esculentum* and *N. tabacum.*
Yellow mosaic, (mild, intense or medium), McKinney, D. C. 1931.
Hy III, Hamilton, England, 1932, I.
Tobacco mosaic, Jones & Burnett, Washington, 1935.

NICOTIANA GLUTINOSA

Glass house streak (identical with tobacco mosaic), Ainsworth, England, 1933.
Mild cucumber mosaic, Hoggan, Wisconsin, 1935. I from cucumber.
New tomato disease, K. M. Smith, England, 1935. I.
Necrotic virus disease of tobacco, K. Smith & Bald, England, 1935. I.
Streak of tomato (& yellow strain of same), K. M. Smith & Bald, England, 1935. I.
Mosaic (same as on *Cheiranthus cheiri*), K. M. Smith, England, 1935. N.

Mosaic, Fernow, New York, 1925, I from apparently healthy potato.
Latent virus of potato, K. M. Smith, England, 1935. Also attacks, *N. tabacum*.
Johnson's tobacco virus No. 1. Stanley, New Jersey, 1936.

NICOTIANA LANGSDORFII
Tobacco mosaic, Holmes, New Jersey, 1932. I from tobacco.
New tomato disease, K. M. Smith, England, 1935.
Tomato streak, K. M. Smith, England, 1935.
Johnson's tobacco virus No. 1. Stanley, New Jersey, 1936.

NICOTIANA LONGIFLORA
Tobacco mosaic, Jones & Burnett, Washington, 1935. I.

NICOTIANA MACROPHILLA
Mosaic, Johnson's virus No. 1. Ainsworth, England, 1933.

NICOTIANA MICRANTHA
Mosaic of beet, Verplancke, Belgium, 1933.

NICOTIANA MULTIVALIS var. of *N. bigelovii*
Tobacco mosaic, Holmes, New York, 1932.

NICOTIANA PALMERI
Tobacco mosaic, Jones & Burnett, Washington, 1935.

NICOTIANA PANICULATA
Tobacco mosaic, Jones & Burnett, Washington, 1935.

NICOTIANA RUSBYI
Tobacco mosaic, Jones & Burnett, Washington, 1935.

NICOTIANA RUSTICA
Latent virus of potato, Jones & Burnett, Washington, 1935.
Bigarrure of potato, Verplancke, Belgium, 1935.

NICOTIANA SUAVEOLENS
Tobacco mosaic, Jones & Burnett, Washington, 1935.

NICOTIANA SYLVESTRIS
Rotterdam B, Jochems, Sumatra, 1928, I.
Yellow mosaic, Jensen, New Jersey, 1933.

NICOTIANA TABACUM
Common mosaic, Woods, U. S. 1899.
Mottle, James Johnson, Wisconsin. I with juice from apparently healthy potato. He reported two viruses, one producing mottle and the other same as virus B.
Specked mosaic of tobacco, James Johnson, Wisconsin, 1926.

NOTE: Up to 1926 it was supposed that tobacco, tomato and other Solanaceae (not including potato) were attacked by a single mosaic. James Johnson showed that there were five, tobacco mosaic, cucumber mosaic, petunia mosaic, speckeled mosaic of tobacco and mild mosaic of tobacco.

Cucumber mosaic (three types), Valleau & Johnson, Kentucky, I from tobacco, melons and milkweed.

Vein margin, Valleau & Johnson, Kentucky, 1928, N. I from tobacco.

Latent virus, Johnson, Kentucky, 1930, I from apparently healthy potatoes.

White & green ring spot, Johnson, Kentucky, 1930.

Spot necrosis, Valleau & Johnson, Kentucky, 1930. I with mosaic virus from Irish potato. I from rugose mosaic of Green Mountain potatoes. I from interveinal of Irish Cobbler potatoes. I with mixture of veinbanding virus and potato virus.

Crinkel A of potato, Salaman, England, 1930, I from potato.

Neerfstreep (vein streak), Jochems, Sumatra, 1930. N.

Ring mosaic, Johnson, Kentucky, 1930. N.

Spotted wilt of tomato, Samuel, Bald & Pittman, Australia, 1930. I from tomato. They observe similar symptoms on *Solanum niger* and *Physalis peruviana*.

Curl or stripe, Böning, Germany, 1931.

Mosaic, van der Meer, Holland, 1931. I from apparently healthy Green Mountain potatoes.

Ring spot type. Henderson, Virginia, 1931. I from sweet clover.

Yellow ring spot, Valleau, Kentucky, 1932. Transmitted by seeds.

Kroepoek, Thung, Java, 1932. Probably same as falltenzerg of Peters & Schwarze (1912), kroepeok and krekoh of Keuchonius (1915) and Gandrup (1924), gila of Jochems (1926), crinkel of Roberts (1930) and crinkel dwarf of Storey (1931). He divided it into (1) common kroepoek, (2) curl and (3) transparent kroepoek.

Streak of potato, Schaffnitt & Muller, Germany, 1931, I from potato.

Yellow spot, Jensen, New Jersey, 1933.

Simple mosaic of potato. Clinch, Ireland, 1933. I.

Virus A of potato, Clinch, Ireland, 1933.

Interveinal mosaic of potato, Clinch, Ireland, 1933. I.

Yellow mosaic of tomato, Stover & Vermillion, Ohio, 1933. I. Jensen of New Jersey reported several strains.

Curly top of sugar beet, Dana, Oregon, N. Bennett of Calif- by inoculation same year.

Virescence (teratology), Ryjkoff, Ukaraine, 1934.

Yellow mosaic of cucumber, Ainsworth, England, 1934.

Krul (curl) and kroepoek (crinkle), Thung, Java, 1934. Attacks *Ageratum conyzoides*, *Synedrella nodiflora* and *Vernonica cinerea*. Probably transmitted by *Bemisia* sp.

New tomato disease, K. M. Smith, England, 1935.

Necrotic virus disease, K. M. Smith & Bald, England, 1935.

Tomato streak (on white burley), K. M. Smith, England, 1935. Also a yellow strain obtained from white burley.

Bunchy top of tomato, McClean, South Africa, 1935. By grafting.

Mosaic (same as on *Cheiranthus cheiri*), K. M. Smith, England, 1935.
New virus disease, K. M. Smith, 1935. Occasionally attacks *N. glutinosa.*
Mosaic of sugar beet, Verplancke, Belgium, 1934.
Bigarrure of potato, Verplancke, Belgium, 1935.
Stolbur, Koratshevsky, Russia, 1935.
Streak, J. Johnson, Wisconsin, 1936. This disease is due to rather rare, distinct, sensitive virus.
Yellow mosaic of tobacco, Jensen, New Jersey, 1936. He reported 51 strains derived from common tobacco mosaic.
New disease (probably virus) in Mauritius. Shepherd. 1936. Very similar to kroepoek disease in Java and the leaf curl or crinkle dwarf in Africa.

NOTE: A virus disease of tobacco transmitted by *Thrips tabaci* was reported from South Africa by Moore in 1932. K. M. Smith (1933) suggested that this disease may be due to the same virus as the yellow spot of the pineapple in Hawaii and the spotted wilt of tomato.

NICOTANA TRICONOPHYLLA
Tobacco mosaic, Jones & Burnett, Washington, 1935.

NICOTIANA TRIPLEX
Mosaic, Kostoff, Russia, 1933.

PETUNIA sp.
Mosaic, Johnson's No. 1, Ainsworth, England, 1933.
Interveinal mosaic of potato, Clinch, Ireland, 1933, I.
Potato calico, Porter, California, 1935.
Streak of tomato, K. M. Smith, England, 1935. I.

PETUNIA HYBRIDA
Veinbanding component of rugose mosaic of tomato. Dykstra, 1933, I by Aphis.
Bunchy top of tomato, McClean, South Africa, 1935. I.
Bigarrure of potato, Verplancke, Belgium, 1935.

PETUNIA NYCTAGINIFOLIA
X virus of potato, Bohme, Germany, 1933. I.
Bigarrure of potato, Verplancke, Belgium, 1935.

PHYSALIS sp.
Mosaic and cucumber mosaic are intertransmissible according to Walker. 1924.
Cucumber mosaic (type 1) Johnson, Kentucky, 1930.
Virus disease, Moore, South Africa, 1932. May be same as spotted wilt.

PHYSALIS ALKENKEGI
Tobacco mosaic, Hoggan, Wisconsin, Gives mottling symptoms. Previously supposed to be a symptomless carrier.
Mosaic of beet, Verplancke, Belgium, 1934.
Yellows of beet, Verplancke, Belgium, 1934.
Bigarrure of beet, Verplancke, Belgium, 1935.

PHYSALIS ANGULATA
Bunchy top of tomato, South Africa, I. 1935.

PHYSALIS FRANCHETTI
Common tobacco mosaic, Hoggan, Wisconsin, 1927.

PHYSALIS PERUVIANA
Mosaic, Crawford, Iowa, 1921. N.
Bunchy top of tomato, McClean, South Africa, 1935, I.

PHYSALIS PUBESCENS
Cucumber mosaic (three types), Johnson, Kentucky, 1930, I.
Glass house streak. Identical with tobacco mosaic, Ainsworth, England, 1933.

PHYSALIS VISCOSA
Bunchy top of tomato, McClean, South Africa, 1935, I.

PHYSOCHLAENA ORIENTALIS
Mosaic of beet, Verplancke, Belgium, 1934.
Yellows of beet, Verplancke, Belgium, 1934.

SALPIGLOSIS sp.
Spotted wilt of tomato, K. M. Smith, England, 1935, N.

SCHIZANTHUS sp.
Spotted wilt of tomato, K. M. Smith, England, 1935, N.

SOLANUM ACULEASTRUM
Bunchy top of tomato, McClean, South Africa, 1935, I. One case only.

SOLANUM ACULEATISSIMUM
Bunchy top of tomato, McClean, South Africa, I. 1935.

SOLANUM ALIATUM
Bunchy top of tomato, McClean, South Africa, 1935, I.

SOLANUM CABILIENSE
Tobacco mosaic, Hoggan, Wisconsin, 1927.

SOLANUM CALCASII
Leaf roll, Ducomet, France, 1921, N. Same as on potato.
Curly leaf, Ducomet, France, 1921, N. Same as on potato.

SOLANUM CAPSICASTRUM
Bigarrure, Verplancke, Belgium, 1935.

SOLANUM CILIATUM
Glass house streak, Identical with tobacco mosaic, Ainsworth, England, 1933.
Mosaic (Johnson's No. 1), Ainsworth, England, 1933.

SOLANUM DULCAMARA
Simple mosaic of potato, Clinch, Ireland, 1933, I.
Crinkle of potato, Clinch, Ireland, 1933, I.
Latent virus of potato, Jones & Burnett, Washington, 1935.

SOLANUM DUPLOSINUATUM

Bunchy top of tomato, McClean, South Africa, 1935. One case by inoculation and one case by grafting.

SOLANUM HUMILE

Krausel mosaic (or tomato mosaic), Schaffnitt & Muller, Germany, 1931, I from *L. esculentum* and *S. integrifolium.*

Streak necrosis of tobacco, Schaffnitt & Muller, Germany, 1931, I from *S. tuberosum.*

SOLANUM INCANUM

Bunchy top of tomato, McClean, South Africa, I, 1935.

SOLANUM LYCOPERSICUM

Bigarrure of potato, Verplancke, Belgium, 1935.

SOLANUM MARGINATUM

Tobacco mosaic, Hoggan, Wisconsin, 1927.

SOLANUM MELONGENA

Mosaic which attacks *Hibiscus esculentum,* Park, Ceylon, 1929.
Veinbanding, Johnson, Kentucky, 1930. I.
Healthy potato virus, Johnson, Kentucky, 1930, I.
Cucumber mosaic (three types), Johnson, Kentucky, 1930. I.
Tomato mosaic, Ramsey, Minnesota, 1922.
Crinkle of potato, Clinch, Ireland, 1933, I.
Mosaic (Johnson's Virus No. 1), Ainsworth, England, 1933.
Curly top of sugar beet, Oregon, 1934, N.
Potato calico, Porter, California, 1935.
Bunchy top of tomato, McClean, South Africa, 1935, I.
Yellow mosaic of cucumber, Hoggan, Wisconsin, 1935, I from cucumber.

SOLANUM NIGRUM

Y virus of potato, K. M. Smith, England, 1931, I from potato.
Yellow mosaic of tomato, Stover & Vermillion, Ohio, 1933, I from tomato.
Latent virus of potato, Jones & Burnett, Washington, 1934.
Yellow varient of tomato streak, K. M. Smith, 1935.
Bunchy top of tomato, McClean, South Africa, 1935, I.
Yellow mosaic of cucumber, Hoggan, Wisconsin, 1935, I from cucumber.
Bigarrure of potato, Verplancke, Belgium, 1935.

SOLANUM PANDURAEFORME

Bunchy top of tomato, McClean, South Africa, 1935. I. One case.

SOLANUM PYRACANTHUM

Tobacco mosaic, Hoggan, Wisconsin, 1927, I. Some authors referred to this as a symptomless carrier.

SOLANUM SODOMACEUM

Bunchy top of tomato, McClean, South Africa, 1935. I. One case.

SOLANUM TUBEROSUM

Curl, Maxwell, England, 1757. This appears to be the first record of a virus disease of potatoes but we do not know to what disease it refer. This disease was known on the continent and there may be other records that antidate this one.

Mosaic, Allard, D. C. 1912. I from *N. tabacum*. I from *L. esculentum* and *S. tuberosum* by Fernow in 1925 and from *C. sativus* by Doolittle & Walker in 1932.

Crinkle mosaic, Schultz & Folsom, Maine, 1925. Later studies have shown that this is not the same as the crinkle of Europe.

Mosaic ex, Clinch, 1933 Ireland. Same as reported by Salaman in 1930 as reduced crinkle.

Mosaic ex C, Clinch & Loughnane, Ireland, 1933. Corresponds to simple mosaic.

Interveinal mosaic, Quanjer, Holland, 1923. I.

Aucuba mosaic, Quanjer, Holland, 1923. I.

Rugose mosaic, Gardner, Kentucky, 1923. Observed. Again by Valleau & Johnson, Kentucky, 1930. They believed it to the same as spot necrosis of tobacco. It was apparently caused by a combination of a healthy potato virus and veinbanding virus. Kock of Wisconsin, 1930 said it was due to a mottle virus (normally present in apparently healthy potatoes) and veinbanding virus.

Super mild. mosaic, Jones. Anderson & Burnett, Washington, 1934.

Foliar necrosis (virus D), Bawden, England, 1934. N.

Simple mosaic, Clinch, Ireland, 1933, N. She says that this was reported by Murphy & McKay (1931 & 32) but the publications are not available for the compiler.

Mild mosaic, Schultz & Bonde, Maine, 1934. Due to two components, a latent virus of the Green Mountains and some other varieties plus a virus causing light green and slightly rugose leaves.

Streak, Orton, U. S. 1912, N. Quanjer & Oortwijn, Holland, 1930, reported four types—Stipple streak of Atanasoff, Stipple streak in May Queen, Stipple streak in Noordling and stipple streak disease.

Streak from tomato (Arran variety), K. M. Smith & Bald, England, 1933.

Stipple streak, Quanjer, Holland, 1923. N. He believes it to be the same as streak reported by Orton from U. S. Atanastoff reported a stipple streak from Holland, 1925, which he regarded as an intensified form of mosaic.

NOTE: Stipple streak or leaf drop of Orton may be same as Acropetal mosaic, or it may be a reaction in some varieties to K. M. Smith's virus Y, according to Salaman & Bawden, 1932.

Net necrosis, first described by Orton in 1914. Schultz & Folsom (1923) believed that it was a symptom of leaf-roll. Gilbert (1923) believed that it was associated with spindle sprout and

leaf roll. Atanasoff (1926) said that it was a distinct disease and that the leaf symptoms varied according to Quanjer's aucuba (1923) mosaic. Schultz & Folsom, Maine, (1920) produced the disease by inoculation and by graft form apparently healthy potatoes.

NOTE: Atanasoff (1926) said: "Net necrosis is a tuber symptom not of leaf roll, but of aucuba mosaic. Spindle sprout, supposed by some to develop on those potato tubers affected with leaf roll and with net necrosis, has no relation to leafroll."

Acropetal necrosis, pseudonet necrosis and concentric necrosis, Quanjer, Holland, 1931.

Acronecrosis (top-necrosis internal, acropetal necropetal necrosis (leaf drop streak) & phloem necrosis (leaf roll) Bawden, England, 1932.

Top necrosis, Oortwijn & Quanjer, Holland, 1930. Four types as follows,—Yellow dwarf of Barrus & Chupp, top necrosis latent in Green Mountains, top necrosis latent it Duke of York, top necrosis latent in Monocrat and some strains of Red Star.

Top necrosis is same as Quanjer's acronecrosis according to Salaman & Bawden, England, 1932. It is dvisible into—(1) top necrosis X due to X virus, (2) top necrosis A due to a complex of X & Y viruses and possibly associated with Z virus, (3) top necrosis B due to complex of Z & Y viruses and (4) top necrosis C due to X & Y viruses and containing necrotic and mosaic symptoms.

Necrosis (on British Queen), Schultz & Raleigh, California, 1933. Inoculated into tobacco, tomato and *D. stramonium*.

Necrotic virus disease, Schultz & Raleigh, California, 1933. N. First found in California in 1929. Has been transmitted to *D. stramonium*.

Necrotic disease of tobacco, K. M. Smith & Bald, England, 1935, I. A letter from Schultz says that necrosis is a symptom of leaf-roll.

Crinkle, K. M. Smith, England, 1930, Due to X and Y viruses.

The needle transmits both viruses but *Myzus persicae* transmits Y only. K. M. Smith says that these viruses belong to the crinkle mosaic group.

Crinkle A, Salaman, Redcliff & LePelly, England, 1930, N.

Crinkle, Clinch, Ireland, 1935. She says that this is the same as Murphy's Canadian crinkle (1921), Quanjer (1923) and Salaman (1923) as reduced crinkle.

NOTE: Crinkle is same as frisolee and caused by Z & Y viruses according to K. M. Smith & Dufrenoy, 1934.

Leaf drop mosaic, Murphy, Ireland, 1923. I.
Spindle tuber, Folsom, Maine, 1924.

Latent virus, J. Henderson Smith, England, 1928. He said this virus was known in England as Y and in America as veinbanding.

Top-necrosis = Acronecrosis. Salaman and Bawden. England. 1932.

NOTE: Salaman (1932) said—

"The Z virus acting alone has a very limited pathogenicity but acting in unison with either X or Y or both, it brings about the disease known as crinkle A and para crinkle.

"When certain virus elements X, Y, or Z are brought together experimentally in appropriate groupings, it has proved possible to build up such clinical pictures as Interveinal Mosaic, Crinkle A, and para-crinkle, i. e., virus complexes have been synthesized in the potato."

Kringerigheid, Klebahn, Holland, 1930, N. Similar to pseudonet necrosis. Occurs on certain soils.

Veinbanding virus, Valleau & Johnson, Kentucky, 1930. Same as on tobacco.

Interveinal mosaic, K. M. Smith, England. 1930.

Virulent virus, Burnett & Jones, Washington, 1931. Attacks tomato.

Ring spot of tobacco, Henderson, Virginia, 1931. I.

Spotted wilt of tomato, K. M. Smith, England, 1932.

Potato ring spot virus, Kock, Wisconsin, 1933. May have almost the same effect as mottle virus.

Veinbanding component of tomato rugose. Dykstra, 1933. I by aphids.

California aster yellows, Severin & Haasis, 1934, Calfornia, I by *C. divisa.*

Bunchy top of tomato, McClean, South Africa, I. Difficult to transmit.

Psyllid yellows, Richardson, Utah, 1927. N. Has the appearance of a virus disease but the evidence indicates that it is due to *Paratriozoa cockerelli.*

Bigarrure or mosaic streak, Verplancke, Belgium, 1935.

Concentric necrosis, Roshalin, Russia, N. 1935. Appears to be due to soil.

Latent virus potato, Jones & Burnett, Washington, 1935. I.

Latent virus of potato, Chester, New Jersey, 1935. Includes many strains.

NOTE: Dykstra (1936) published a paper on comparative studies on European and American potato viruses. He said—

The X virus of Europe is similar to the so-called latent virus of America.

The Y virus and vein-banding virus (rugose mosaic without the X component) belong to the same group but are not identical.

Paracrinkle of Europe does not resemble leaf-rolling mosaic or any other American potato virus.

Crinkle A of Europe is not identical with rugose mosaic of America.

Virus C of Europe does not resemble any known virus of potatoes in America.

NOTE: M. A. Watson writes (May 11, 1936) to the compiler as follows: Dr. Kenneth M. Smith's remarks apply only to Hy. II and Hy. IV, which he regards as strains of Potato mosaic. Hy. III is an entirely different virus and does not go into potato at all. Hy. IV may be the same as Potato virus X but neither of these viruses is transmitted by *M. persicae.*"

NOTE: Jones, Anderson & Burnett (1934) reported that all commercial American potatoes contained symptomless viruses. Three that have been definitely recognized are known as mottle, ring spot and spot necrosis.

NOTE: K. M. Smith (1935) says that the X virus of England is same as the "healthy potato virus" of the United States.

NOTE: "Wilding" of potatoes appears to be the same as witches' broom.

Folsom & Bonde of Maine published a list of 26 viruses in 1936. They are as follows:

"(1) Tobacco mottle and/or ringspot of J. Johnson. Usually found together. Masked in most potato varieties. Synonyms: potato mottle and potato ringspot of Koch and Johnson; seedling streak; latent virus; healthy-potato virus; X virus; B virus of Fernow; simple mosaic; acronecrosis or top-necrosis. Probably several closely related viruses are involved.

"(2) Tobacco ringspot of Virginia. Results in local infection of potato but is entirely distinct from the healthy-potato virus.

"(3) Tobacco mosaic. May be only partially systemic in potato plants of some varieties.

"(4) Cucumber mosaic.

"(5) Green Mountain rugose mosaic. Viruses: pure rugose mosaic and latent. Synonyms: veindbanding and mottle or ringspot, in combination.

"(6) Green Mountain mild mosaic. Viruses: pure mild mosaic and latent.

"(7) Green Mountain crinkle mosaic. Viruses: probably pure crinkle mosaic and latent.

"(8) Green Mountain leaf-rolling mosaic. Viruses: probably pure leaf-rolling mosaic and latent.

"(9) Green Mountain interveinal mosaic. Viruses: probably pure interveinal mosaic and latent.

"(10) Aucuba mosaic.

"(11) Calico of Porter.

"(12) Green Mountain streak. Viruses: Possible Y of Smith and latent.

"(13) Streak of Koch and Johnson.

"(14) Tomato spotted wilt.

"(15) Bigarrure of Verplancke.

"(16) Leaf roll.

"(17) Apical leaf roll of Schultz & Bonde. Synonym: probably yellow top of Folsom (oral conclusion, Schultz to Folsom).

"(18) Witches' broom. Synonym: wilding.

"(19) Yellow dwarf.
"(20) Aster yellows.
"(21) Beet curly top.
"(22) Spindler tuber.
"(23) Unmottled curly dwarf.
"(24) Transmissible low-growing habit of M'Intosh.
"(25) Pseudonetnecrosis.
"(26) Internal spotting in tubers (excluding some non-virotic kinds.

"Green Mountain mottled curly dwarf is a mixture of leaf-rolling mosaic and spindle tuber. In general however, curly dwarf is a mixture whose composition has been rather indefinite. The same is true of mosaic dwarf, leaf curl, and stipple streak.

"Of tobacco spot necrosis, crinkle, paracrinkle, Up-to-Date streak, acropetal necrosis, A of Ireland, and B, C, D, and Z of England, each probably, or at least possibly, is the same as one of the list above, or a mixture of some of those listed above.

"Marginal leaf roll and giant hill possibly are not viroses."

SOLANUM PYRACANTHUM
Mosaic, Hoggan, Wisconsin, 1927.

SOLANUM VILLOSUM
Rugose mosaic of Dykstra, 1933. I from potato.
Leaf roll, Dykstra, 1923. I from potato and *Datura tatula* by *Myzus persiceae.*
Veinbanding component of tomato rugose mosaic, Dykstra, I by aphids.

ULMACEAE

ULMUS sp.
Mosaic, Atanasoff, Bulgaria, 1935.

UMBELLIFEREAE

APIUM GRAVEOLENS
Aster or carrot yellows obtained from all states except California. Severin & Haasis (1934) reported that this host was susceptible to all strains.

APIUM GRAVEOLENS CELERIAC
Celery yellows.

APIUM GRAVEOLENS RAPECEUM

NOTE: Kunkel (1932) reported that the celery yellows of California could not be distinguished from Aster yellows in New York. It is transmissible by *C. sexnotata.*

DAUCUS CAROTA var. *sativa.*
Tobacco mosaic, Jones & Burnett, Washington, 1935.

LIGUSTRUM VULGARE
Chlorosis, Baur, Germany.

VERBENIACEAE

LANTANA sp.
Sandal spike, suspected for many year. Confirmed by Vraradaraja Iyengar & Rangaswami, India, 1935. In manuscript.

CHLORODENDRON FRAGANS
Mosaic, Blattny, 1924, N.

VERBENA URTICAIFOLIA
Mosaic, Curtis, Iowa, 1919, I.

VIOLACEAE

CULTIVATED PANSY
Curly top of beet, Dana, Oregon, 1934. N.

VIOLA *sp.* (Violet and pansey)
Cucumber virus 1, K. M. Smith, England, 1936.

VIOLA ARVENSE TRICOLOR
Mosaic of beet, Verplancke, Belgium, 1932, I.

VIOLA PAPILIONACEAE
Ring spot of tobacco, Wingard, Virginia, 1929, I from tobacco.

VIOLA TRICOLOR
Ring spot of tobacco, Wingard, Virginia, 1928, I from tobacco.
Vein aucuba, Blattny, Czechoslovakia, 1930.
Virus disease, G. H. Martin, Jr., U. S., 1925.

ERRATA

TO HOST INDEX OF VIRUS DISEASE OF PLANTS

(Vol. XIX. No. 3, pp. 315–406, 1935)

Page 319, line 8—should read *Asclepis syriaca.*
Page 342, line 3.—Maderspatanus should read Maderaspatunus.
Page 342, lines 16 and 18—An error. Omit. Ainsworth stated that cucumbers could not be infected.
Page 362, line 13—should read *Lilium auratum.*
Page 385, line 4—should read Potato yellow mosaic, Henderson Smith, England, 1928, N.
Page 386, line 13.—Ainworth should road Ainsworth.
Page 387, line 22—should read *Nicotiana acuminata.*
Page 388, line 1—should read *tabacum.*

FIRST SUPPLEMENT TO THE INDEX OF VECTORS OF VIRUS DISEASES OF PLANTS*

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This supplement is submitted to the workers on virus diseases of plants hoping that it may be useful in the advancement of this branch of science which is a combination of plant pathology and entomology. It makes the original index fairly complete. About twenty five genera and more than sixty five species of insects are added to the original list. Many new records of transmission are also added to the list.

AMPHOROPHORA ROSSI

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

AMPHOROPHORA RUBI

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

AMPHOROPHORA RUBICOLA

1932. Bennett says this species is less important than *A. rubi.*

ANOECIA sp.

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

APHIS sp.

NOTE: A letter from Dr. Schultz states that he and Dr. Folsom obtained transmission of mild mosaic (1918), leaf roll (1919), spindle tuber (1922), rugose mosaic (1922), leaf rolling mosaic (1922), unmottled curly dwarf (1922) and streak (acropetal necrosis) (1924).

1925. Mosaic. *Physalis pubescens* to *Cucumis sativus,* Walker. U. S.

1925. Mosaic. *Physalis sativus, Lathyrus odoratus* and *Trifolium pratense* to *C. sativus* and *L. odoratus.* Doolittle & Jones. U. S.

1925. Mosaic. *Physalis pubescens* to *P. pubescens.* Walker.

APHIS AGERATOIDIS

1933. Yellow dwarf of onion. Onion to Onion. Drake, Tate & Harris. Iowa.

APHIS CARDUI

1933. Yellow dwarf of onion. Onion to Onion. Drake, Tate & Harris. Iowa.

* Journal of the Department of Agriculture of the University of Puerto Rico. 19(3): 407–420. July, 1935.

APHIS DECEPTA

1933. Yellow dwarf of onion. Onion to Onion. Drake, Tate & Harris. Iowa.

APHIS FABAE

1927. Mosaic. *Vicia faba* to *V. faba.* Böning, Germany.

1929. Mosaic. *Phaseolus vulgaris* to *Vicia faba.* Elze. Holland. A record for 1927 was not positive.

1930. Mosaic. Sugar beet to *Chenopodium album, Amaranthus* and *S. arvensis.* Novinenko. Ukarane.

APHIS FORBESI

1933. Yellow dwarf of onion. Onion to Onion. Drake, Tate & Harris. Iowa.

1934. Mosaic of sugar beet to several plants. Verplancke. Belgium.

APHIS GOSSYPII

1914. Mosaic, *Lathyrus odoratus* to *L. odoratus.* Taubenhaus. Delaware.

1925. Yellow flat mosaic. Easter lily to Eastern lily. *Ogilvie.* Bermuda.

1925. Garden pea & sweet pea to garden pea & sweet pea. Doolittle & Jones. U. S. Note. Hoggan says that this is *Illinoia* sp.

1925. Mosaic. Red clover to garden pea. Doolittle & Jones. U. S.

1925. Mosaic. Cucurbits to cucurbits. Doolittle & Jones. U. S.

1925. Mosaic. Easter lily to Easter lily. Gutermann. New York.

1925. Mosaic. Cucumber to *Physalis pubescens.* Walker. U. S,

1925. Mosaic. Celery to celery and cucumber. Elmer. Iowa.

1933. Mosaic. Bean to bean. Zaumeyer. U. S.

1933. A virus disease of *Lilium longiflorum* var. *formosum* and var.. *erabu.* Also *L. auratum.* Pape. Germany,

1935. Fern leaf of tomato. Jones & Burnett. Washington. Note. Same as cucumber mosaic.

1934. Mosaic. Vegetable marrow (Cucurbita?) to Vegetable marrow. Gigante. Italy.

APHIS MAIDIS (A. ADUSTA)

1929. Storey, reported a strain of mosaic transmitted to maize and Sorghum but not to sugar cane.

1923. Sugar cane mosaic. *Saccharum officinarum* to *Miscanthus sinensis, Syntherisma anguinalis, Paspalum boscianum, Holcus sorghum, Brachiaria platyphylla, Chaetochloa lutescens, C. magna* and *Panicum dichotomiflorum.* Brandes & Klaphaak. U. S.

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

APHIS MEDICAGINIS
1936. Mosaic. Bean to bean. Zaumeyer & Kearns. U. S.

APHIS OENOTHERAE
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

APHIS POMI
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

APHIS RHAMNI
Said to carry a virus of *Cirsium* sp. and *S. tuberosum.* No data.

APHIS RUBIPHILA
1927. Curl. Raspberry to raspberry. Bennett, Michigan. May rarely carry mosaic.

APHIS RUMICIS
1931. Yellows. Spinach to spinach. Blattny. Czechoslovakia.
1934. Mosaic. *Vicia faba* to *V. faba.* Imai. Japan.
1935. Sore shin of *Lupinus angustifolius.* Broad bean to broad bean. Chamberlain. Australia.

APHIS SPIRAECOLA
1936. Mosaic. Bean to bean. Zaumeyer & Kearns. U. S.

APHIS VIBURNICOLA
1933. Yellow dwarf. Onion to onion. Drake, Tate & Harris. Iowa.

AULACORTHUM PELARGONII
1934. Mosaic of beet to several hosts. Verplancke. Belgium.

BEMISIA sp.
1932. Kroepoek of tobacco & *Zinnia elegans.* Kerling. Java.

BEMISIA FASCIALIS
1931. Leaf curl. Cotton to cotton. Kirkpatrick. Sudan.

BEMISIA GOSSYPIPERDA
1935. Azerbaijan. Cotton to cotton. Verderevsky. Russia.

BEMISIA NIGERNIENSIS
1934. Probably carries krul (curl) and kroepoek (crinkle) of tobacco. Thung. Java.
1935. Mosaic. Cassava to cassava. Golden. Southern Nigeria. Record not positive.

BREVICORYNE BRASSICAE
1933. Mosaic. Bean to bean. Zaumeyer.
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CALOCORIS BIPUNCTATUS
1933. Virus A. Potato to potato. Loughnane. Ireland.

CALAPHIS BETULELLA

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CAPITOPHORUS FLAVEOLUS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CAPITOPHORUS RIBIS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CHAITOPHORUS QUERCICOLA

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CAPITOPHORUS VIMINALIS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CHLORITA FLAVECENS (*Empoasca*)

1928. Mosaic. Celery to celery Blattny. Czechoslovakia.

CHLORITA SOLANI

Mosaic. Beans to beans. No data.

CICADULA DIVISA

1934. California aster yellows. Aster to potato. Severin & Haasis. California.

CICADULA SEXNOTATA (*C. divisa*)

1924. Yellows. Aster to aster. Kunkle. New York.

1929. Celery yellows. Celery to celery. Severin. Calif. Same as aster yellows.

1930. Yellows. Carrot, parsley & parsnip to aster & celery. Severin. California. This virus is identical with California aster & celery yellows.

1930. Yellows. Aster & celery to parsley. Severin. California.

1932. California yellows. Aster to aster. Kunkel. New York.

1932. California yellows. Celery to aster. Kunkel. New York.

1932. California yellows. Carrot to aster. Kunkel. New York.

1932. Yellows. Carrot to aster & celery and back. Severin, California.

1932. Yellows. Celery to aster & celery and back. Severin. California.

NOTE: The last three are same as California aster yellows.

1932. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

CICADULINA ZEAE

1931. Streak. Corn to corn. Tanganyika. Storey.

CLAVIGERUS SALICIS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

DIABROTICA DUODECIMPUNCTATA
1935. Fern leaf of tomato. Jones & Burnett. Washington.

DIABROTICA VITTATA
1935. Fern leaf of tomato. Jones & Burnett. Washington. Same as cucumber virus.

DREPANAPHIS ACERIFOLIAE
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

DORALYS FABAE
1934. Mosaic. Beet to other hosts. Verplancke. Belgium.

EMPOASCA FABAE
1928. Yellow top of alfalfa. Appears to be associated with this insect. Granovsky. Wisconsin. There may be an earlier record.

EMPOASCA MALI
Yellows. Bean to bean. R. C. Smith & Barker. Haiti. It has not been proven definitely that this disease is due to a virus.

EPITETRANYCHUS ALTHAEAE
1935. Virus disease. Legume to legume. Dounine, Russia. No definite data.

EPITRIX CUCUMERIS
1924. Mosaic. Tomato to tomato. Dickson. Canada.

EUTETTIX TENELLUS
1927. Curly top of sugar beet. Sugar beet to tomato. McKay & Dykstra. Pacific Coast.
Tomato yellows (curly top of sugar beet). Tomato to tomato. McKay & Dykstra. Oregon.

HYALOPTERIS ATRIPLICIS
1933. Mosaic. Bean to bean. Zaumeyer. U. S.
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.
1933. Mosaic. *Pisum sativum* to *P. sativum*. Doolittle & Jones. U. S.

HYLAOPTERIS PRUNI
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

HYSTERONEURA SETARIAE
1936. Mosaic. Sugar cane to Sugar cane. Ingram & Summers. Louisiana.

ILLINOIA PISI

1934. Common bean mosaic. Bean to bean. Price. New Jersey.
1934. Yellow bean mosaic. Bean to bean. Price. New Jersey.
1934. Mosaic. Alfalfa to alfalfa. Price. New Jersey.

ILLINOIA SOLANIFOLII

1933. Mosaic. Bean to bean. Zaumeyer. U. S.

LYGUS PRATENSIS

1935. Mosaic. Swede to swede. Pape, Germany.

MACROSIPHUM sp.

1918. Spinach blight. Spinach to spinach. McClintock & Smith. Virginia.
1933. Virus A. Potato to potato. Loughnane. Ireland. Mosaic of sugar beet. No data.

MACROSIPHUM AMBROSIAE

1933. Mosaic. Bean to bean. Zaumeyer. U. S.
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM ARTEMESIAE

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM GEI (*M. solanifolii*)

1935. Fern leaf of tomato. Jones & Burnett. Washington. Same as cucumber mosaic.
1931. Mosaic. Pea to pea. Osborn. New Jersey.

MACROSIPHUM GRAVICORUS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM IMPATIENTICOLENS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM PELARGONIUM

1927. Mosaic. *Vicia faba* to *V. faba*. Böning. Germany.
1930. Leafroll of potato. Potato to potato. Oregon.

MACROSIPHUM PISI

1930 Leafroll of potato. Potato to potato. Oregon.
1932. Mosaic. Clover to clover. Dickson. Canada. He used *Trifolium pratense, T. hybridum, T. repens, T. incarnatum, M. lupina,* & *M. officinalis.*
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM PURPURASCENS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM ROSAE
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM RUDBECKIAE
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM SOLANIFOLII
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.
1933. Mosaic. Cucumber to spinach. Hoggan. Wisconsin.
1923. Leafroll. Potato to potato. Schultz & Folsom. Maine.
1923. Spindling tuber. Potato to potato. Schultz & Folsom. Maine.
1928. Mosaic. Sugar beet to sugar beet. van der Meulen. Holland.
1933. Veinbanding. Potato to potato, Koch. Wisconsin.
1935. Calico. Potato to potato. Porter California.

MACROSIPHUM SONCHI
1935. Mosaic. Lettuce to lettuce. Ogilvie. England. Suspected as result of preliminary experiments.

MACROSIPHUM TABACI
1914. Mosaic. Tobacco to tobacco. Allard. Washington. Not proven by cage experiments.

MACROSIPHUM TARAXACI
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MACROSIPHUM ULMARIAE
1928. Mosaic. Sugar beet to sugar beet & potato. van der Meulen & Quanjer. Holland.

MAMESTRA BRASSICAE
1927. Mosaic. Potato to potato. Elze. Holland.

MONELLIA CARYELLA
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MONELLIA CARYAE
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZOCALLIS ALHAMBRA
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZOACALLIS ASCLEPIADIS
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZOCALLIS ONONIDIS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZUS CERASI

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZUS CIRCUMFLEXUS

1921. Mosaic. Chinese mustard. & turnip. to some. Schultz. Maine.
1922. Mosaic. Beet to beet. Robbins. Clorado.
1922. Mosaic. Beet to beet. Robbins. Colorado.
1932. Mosaic. Potato to potato. McKay & Dykstra. Oregon.
1932. Mild mosaic. Potato to potato. McKay & Dykstra. Oregon.
1932. Leaf rolling mosaic. Potato to potato. McKay & Dykstra. Oregon.
1932. Crinkle. Potato to potato. McKay & Dykstra. Oregon.

MYZUS FRAGIFOLII

1933. Crinkle. Strawberry to strawberry. Vaughan. Oregon.

MYZUS HIERACII

Mosaic. Lettuce to lettuce. Böning. Germany.

MYZUS MONARDAE

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZUS PERSICAE

1919. Mild mosaic. Potato to potato. Schultz & Folsom. Maine.
1928. Mosaic. *Vicia faba.* var. *major, Sinapsis alba. Rumex domesticus, R. crispus, Tusilago farfara, Polygonum persicaria.* van der Meulen. Holland.
1929. Veinbanding. Tobacco to tobacco. Valleau & Johnson. Kentucky.
1930. Crinkle of potato. Potato to tobacco. K. M. Smith. England. Note-Transmits virus Y only. Both X and Y are transmitted by needle.
1931. Cucumber mosaic. Tomato to tobacco.
1932. Spotted wilt of tomato. *Datura stramonium* & *Capsicum* sp. to *D. stramonium* & *Capsicum* sp. K. M. Smith. England.
1933. Crinkle of strawberry. Strawberry to strawberry.
1933. Crinkle of strawberry. Strawberry to strawberry. Vaughan. U. S.
1933. Leaf roll. Potato to *S. dulcamara, S. villosum,* and *D. stramonium.* Dykstra. U. S.
1933. Veinbanding. Potato to tomato, Dykstra reported that this component only was transmitted from rugose mosaic.
1933. Virus A of potato. Potato to potato. Clinch. Ireland.
1933. Leaf roll of potato. Potato to tomato, pepper, *D. stramonium, D. tatula, S. dulcamara* and *S. nigrum.*

1933. Mosaic. Bean to bean. Zaumeyer. U. S.
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.
1934. Bigarrure of potato. Verplancke, Belgium.
1935. Fern leaf of tomato. Tomato to tomato. Jones & Burnett. Washington. They believe this is cucumber virus.
1935. Yellow mosaic. Cucumber to cucumber. Hoggan. Wisconsin.
1934. Virus Y of potato. Transmitted independently of the X virus when associated. K. M. Smith & Dufrenoy. England.
1935. Sore shin of *Lupinus angustifolia.* Garden pea to garden pea. Chamberlain. Australia.
1935. Mild mosaic. Cucumber to cucumber. Hoggan. Wisconsin.

NOTE: Valleau & Johnson. Kentucky say that *"Myzus persicae"*, rarely if ever transmits the healthy potato virus, while it regularly transmits the vein-banding virus from virus mixtures.

NOTE: Mosaic of *Cheiranthus cheiri* appears transmitted among several hosts, especially Cruciferae.

1928. Mosaic. Sugar beet to sugar beet, potato & spinach. van der Meulen & Quanjer. Holland.

MYZUS POROSUS
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

MYZUS PSEUDOSOLANI
1931. Leafroll. Potato to potato. Murphy & McKay. Ireland. 1929. K. M. Smith. England. 1931.
1931. Tobacco mosaic and yellow mosaic of tobacco from tomato but not from tobacco. Hoggan. Wisconsin.

MYZUS SOLANIFOLII (*Macrosiphum gei*)
1926. Mosaic. Potato. Murphy & McKay. Ireland.

NEMATUS VENTRICOSA.
1930. Mosaic. *Convolvulus arvensis* to *C. arvensis.* Blattny. Czechoslovakia.

NEOPHOTETTIX APICALIS var. CINCTICEPS

NOTE: The period of study of the dwarf of rice appears to have started about 1897.

PERIPHYLLUS NEGUNDINIS
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

PERIPHYLLUS POPULICOLA
1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

PHILAENOUS SPUMARIUS
1923. Leaf roll. Potato to potato. Murphy. Ireland.

PROCIPHILUS CORRUGATANS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

PSYLLOIDES AFFINIS

1923. Leaf roll of potato. Potato to potato. Murphy. Ireland.

RHOPALOSIPHUM (MYZUS) PERSICAE

1928. Mosaic. *Vicia faba* var. *major* to *V. faba* var. *major*. van der Meulen. Holland.

RHOPALOSIPHUM PSEUDOBRASSICAE

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

1936. Mosaic. Bean to bean. Zaumeyer & Kearns. U. S.

RHOPALOSIPHUM RHOIS

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

THAMNOTETTIX GEMINATUS

1934. California aster yellows and celery yellows. Severin. California.

THAMNOTETTIX MONTANUS

1934. California aster yellows & celery yellows. Severin. California.

THRIPS sp.

1935. Stolbur. Appears to be vector of this disease which occurs on *Lycopersicon esculentum, Atropo belladonna, Datura stramonium, Nicotiana tabacum* and *Convolvulus arvensis*, Koratshevsky, Russia.

THRIPS TABACI

1927. Mosaic. Spinach & beet to spinach & beet. Proof not positive.

Potato leaf roll. K. M. Smith used many hosts.

1932. Virus disease of tobacco. Moore. Africa, K. M. Smith (1933) suggested that this disease might be due to the same virus as yellow spot of pine apple in Hawaii and spotted wilt of tomato.

THRIPSAPHIS BALLI

1933. Yellow dwarf of onion. Onion to onion. Drake, Tate & Harris. Iowa.

TIPULA PALUDOSA (larval form)

1927. Potato virus disease. Elze. Holland.

TOROPTERA GRAMINUM

1936. Mosaic. Sugar cane to sugar cane. Ingram & Summers. Louisiana. Two case only.

TRIALENOIDES VAPORARIORUM

1930. Cucumber mosaic. Cucumber to cucumber. Bewley & Corbett. England. One case.

TYPHOLORYBA ULMI

1923. Leafroll. Potato to potato. Murphy. Ireland.

ZOSMENUS QUADRATUS

Mosaic. Beet to beet. Germany.

ERRATA

TO THE INDEX OF THE VECTORS OF VIRUS DISEASES OF PLANTS

Journal of the University of Puerto Rico. Vol. XIX, No. 3, pp. 407–420, 1935.

Page 413, line 6—should read Cicadulina.

Page 418, line 11—M. A. Watson writes to the compiler as follaws: "Dr. K. M. Smith's remarks applied only to Hy. II and Hy. IV, which he regards as strains of Potato mosaic. Hy. III is an entirely different virus and does not go into potato at all. Hy. IV may be the same as Potato virus X but neither of these viruses is transmitted by *M. persicae.*"

SECOND SUPPLEMENT

TO

PARTIAL BIBLIOGRAPHY OF VIRUS DISEASES OF PLANTS *

By José I. Otero, *Librarian*, and Melville T. Cook, *Plant Pathologist*,

Agricultural Experiment Station, College of Agriculture of the University of Puerto Rico, Río Piedras, P. R.

Afzal, H. M., Jaggi, S. S., & Singh, B.
A note on a survey of the disease of malformation in the Punjab-American cottons. Indian Journ. Agric. Sci. **5**(5) : 624–631, 1935.

This disease has been tentatively identified as stenosis. Although this is not strictly a virus disease paper we decided to include it, because some workers have regarded stenosis as a virus disease.

Agee, H[amilton] P[ope]
The Hawaii system of sugar-cane quarantine. Proc. Fifth Congress Soc. Sugar Cane Tech. Brisbane, Australia, **1935** : 707–710, 1935.

This paper contains one paragraph on *Perkinsiella saccharicida*.

Ainsworth, G. C.
Fig mosaic. Journ. Roy. Hort. Soc. **60**(12) : 533, 1935.

Report of a fig mosaic in Great Britain. The author claims that although there is no printed record of such maladie occurring in Great Britain it has been known for at least twenty years.

———
Virus diseases of cucumbers. Journ. Minis. Agric. **42**(4) : 338–344, 1935.

Brief popular descriptions of (1) green-mottle mosaic (cucumber virus 3), (2) yellow mosaic (cucumber virus 4) and (3) yellow mottle mosaic (cucumber virus 1). Also a brief discussion of the causative agents, transmission of the diseases and methods of control.

———
Another new virus disease of tomato. Gard. Chron. **98**(2549) : 320–321, 1935.

A description of a disease reported by K. M. Smith, June 1, 1935. Produces enations similar to those described by Jensen on tobacco. The disease is due to ordinary tomato mosaic virus.

* Journ. Agric. Univ. Puerto Rico 18(1–2) : 1–410, 1934. First Suppl. 19(2) : 129–313, 1935.

Spotted wilt of Richardias (Arums). Gard. Chron., **97**(2507): 31. 1935.

A short illustrated note indicating the symptoms and suggesting control measures.

"Bushy stunt": a virus disease of the tomato. Journ. Min. Gt. Brit. **43**(3): 266–269, 1936.

Detection of spotted wilt virus in chrysanthemums. Nature **137**: 868, 1936.

The disease is abundant on ornamental plants. The virus is inactivated by an extract of healthy chrysanthemum leaves added to an extract of diseased tomato leaves.

---, **& Selman, I. W.**

Some effects of tobacco mosaic virus on the growth of seedling tomato plants. Ann. Appl. Biol. **23**(1): 89–98, 1936.

Johnson tobacco virus No. 1 was used. The authors give the results of a series of experiments which they summarize as follows:

"A negative correlation has been shown to exist between the growth rate of seedling tomato plants and the length of the incubation period.

"Evidence has been presented, which suggests that the relative effects of *tobacco virus* 1 on the growth rate of the plant subsequent to the appearance of symptoms is the same in both summer and winter.

"The percentage water content of all parts of infected plants was found to be lower than that of the controls, during the early stages of the disease. Later the water content tended to rise above that of healthy plants."

Anderson, Rudolph Daniel

A study of some abnormalities occurring in certain potato varieties in California. Colorado Agric. Expt. Sta. Tech. Bull. **16**, 52 p., 1936.

Contains some interesting data on virus diseases.

Anonymous

Leaf-roll and mosaic diseases of the potato. Ireland, Dept. Agric. Leaflet **29**, 1933.

The growing and marketing of potatoes for seed. Ireland, Dept. Agric. Leaflet **8**, 1934.

New York Cornell Agric. Expt. Sta. Forty-seventh Annual Report for the year **1933–34**: 102, 1935.

Note on work in progress.

Die Blattrollkrankheiten der Kartoffel. Ernährungestörung oder infektion? Ungelöste Probleme. Der Kartoffelbau 18. Jarhrgang, **1934**: 29–30, 1934.

The propagation and maintenance of healthy stocks of potatoes. Gov't. of Northern Ireland, Min. of Agric. Leaflet **73**: 8, 1934.

Annotated bibliography on bitter-pit. Occ. Pap. Bur. Fruit Prod. E. Malling, **3**: 28, 1934.

Although it has not been proved to the satisfaction of all workers that bitter-pit is due to a virus, this publication will be found useful. Contains list of papers since 1869 on bitter-pit of apples.

Our changing agriculture served by Science. Fiftieth Annual Report of the Dir., 1932–33, Wisconsin Agric. Expt. Sta. Bull. **428**: 8, 1934.

A brief note saying that yellow dwarf of potatoes causes a decrease in yields.

Mosaic disease of the sugar cane. Science (Suppl.) **82**(2122): 7–8, 1935.

A statement that Dr. E. W. Brandes and Julius Matz of the U. S. Dept. of Agriculture have discovered that the sugar cane plant fights mosaic "with a virus-paralyzing substance that it forms in the growing tips of its stalks. A stuff that seems to be somewhat analogous to the germ-fighting 'anti-bodies' formed in the bodies of human beings and animals when invaded by disease."

Mosaikayge hos agurker. Gartri-tid. **51**: 417–419, 1935.

Mosaic and nature of virus disease. Int. Sugar Journ. **37**: 460–461, 1935.

New sugar-beet varieties for the curly-top area. U. S. Dept. Agric. Circ. **391**. 4 p., 1936.

Plum and peach virus diseases. Amer. Fruit Grower **56**: 31, 1936.

Virus diseases. Gard. Chron. (London) **99**: 209, 1936.

Anstead, Rudolph D.
Mosaic Disease. Madras Agric. Dept. India, Bull. **92**: 13. (n.d.)

A popular description of sugar cane mosaic and suggestion for its control.

Appel, [Friedrich Carl Louis] Otto
Vitalitat und Vitalitätsbestinumung bei den kartoffeln de Kartoffel **13**: 20–21, 1933.

Arnaud, G., & Arnaud, M.
Les maladies á virus des rosacées amygdalées (Virus disease of the amygdalous rosaceae.) Compt. Rend. Acad. Sci. Paris **202**(10): 869–871, 1936.

Atanasoff, D[imitr]
Old and new virus diseases of trees and shrubs. Phytopath. Zeitschr. **8**(2): 197–223, 1935.

The author observed the following virus diseases in Bulgaria: mosaic of *Populus balsamifera, Corylus avellana, Ulmus* sp., *Acer negundo, Cornus mas,* ash and lilac. Also infectious variegations of *Labrum vulgare* and witches' broom of *Gleditschia triacanthes.*

Atkinson, J. A.
Progress report on the investigations of corky-pit of apples. New Zealand Journ. Sci. & Tech. **16**(5): 316–319, 1935.

This disease has not been proved to be due to a virus but has certain resemblances which make it desirable to include it in this publication.

Bailey, M. A.
Leaf curl disease of cotton in the Sudan. Empire Cotton Growing Rev. **11**(4): 1–9, 1934.

A very comprehensive review of the history of this disease.

Bald, J[ames] G[rieves]
Statistical aspect of the production of primary lesions by plant viruses. Nature **135**(3424): 996, 1935.

A criticism of a paper by Youden, Beale & Guthrie. (Cont Boyce Thomp. Inst. 7: 37, 1935.)

Baribeau, [Charle Henri] B[ernard]
The tuber-unit seed plot in Quebec. Amer. Potato Journ. **12** (3): 62–64, 1935.

Report of a potato tuber-unit seed plot which is considered to demonstrate clearly the value of this method of combating virus diseases.

Barrus, M[ortier] F[ranklin] & Crosby, Cyrus R[ichard]
Control of diseases and insect pests of potatoes in Long Island. Cornell Agric. Expt. Sta. Ext. Bull. **288**, 26 p., 1935.

An outline for potato growers of control measures for virus diseases and other groups of maladies.

Baudys, E[duard]
Nejdúlezitejsi choroby a skudci Merunky a Broskvene a ochrana proti nim. (The most important diseases and pests of the apricot and peach and their control.) Publ. Fytopath. Sekce Zemsk. Vyzk. Ust. Zened. **147**, Zidlochovice, 55 p.. 1935.

An annotated list of the most important diseases of the peach and the apricot giving attention to those caused by viruses. Control measures in each individual case are discussed in details.

Bawden, F. C.
The relationship between the serological reactions and the infectivity of potato virus X. Brit. Journ. Expt. Path. **16**: 435–443, 1935.

A careful study containing much data on this subject.

----------, & Pirie, N. W.
Experiments on the chemical behavior of potato virus X. Brit. Journ. Expt. Path. **17**: 64–74, 1936.

This paper gives the results of the studies in which the authors determined the relation of the virus to several chemicals.

Bechhold, H.
Subvisibles virus und Kolloidforschung. Kolloidztschr. **51**: 134–144. 1930.

----------, Gerlach, W., & Erbe, F.
Die Kupferprobe zur unterscheidung von gesunden und abgebanten Kartoffeln. (The copper test for differentiation of healthy and degenerated potatoes.) Angew Chemie **47**(2): 26–30, 1934.

A sheet of copper is inserted into a tuber for 8 hours at 37°C. followed by 16 hours at room temperature. On cutting the healthy tuber show a dark brown to dark color. The diseased tubers do not.

Bell, Arthur F[rank]
Disease resistant trials in Queensland. Proc. Fifth Cong. Int. Soc. Sugar Cane Tech., Brisbane, Australia, p. 511–517, 1935.

This paper includes a discussion on Fiji disease of sugar cane.

The present status of dwarf disease. Proc. Queensland Soc. Sugar Cane Tech. 7: 129–131, 1936.

Bennett, C[arlyle] W[ilson]
Studies on the properties of the curly top virus. Journ. Agric. Res. **50**(3): 211–214, 1935.

The author describes his methods in details. The aging of the virus depends on the medium and ranged from 7 to 28 days. Also resistance to desiccation reported on the medium and ranged from

2 to 10 months. Thermal inactivation point between 75 and 80 degrees C. No virus was recovered from liquids having a pH of 2.9 or lower. A very high resistance to chemicals.

Berkeley, G[arven Hugh]

Three diseases of lilies. Canadian Florist. **30**(20): 307–308, 1935.

This paper contains a popular discussion of the mosaic disease.

Occurence of "spotted wilt" on tomatoes in Ontario. Sci. Agric. **15**(6): 387–392, 1935.

A description of symptoms on tomato and a study of the disease on *Nicotiana glutinosa*.

Berkner, F. W.

Eisenfleckigkeit bei kartoffeln. Wesentliche Sortenunterschiede-Abhängigkeit der befallstärke von jahreswitterung und boden. Mitt. Landw. **49**: 378–380, 1934. (Zeitsch. Pflanzenk u. Pflanzenschutz **45**: 239. Die Kartoffel **14**: 78–81, 1934. Neuh. Geb. Pflanzensch. (abstract) **1935**: 85, 1935.)

Der Einfluss zurückliegender Kalidüngungen auf das Trachtenbild (Abbauerscheinungen) sowie die Nährstoff aufnahme und die späteren Erträge der Kartoffel-pflanze. III Mitteilung. (The influence of past applications of potash fertilizers on the performance (degeneration phenomena), assimilation of nutriment, and subsequent yields of the potato plant. No. III.) Landw. Jb. **81**(3): 293–423, 1935.

This is a detailed account of the results obtained by experiments conducted by the author. The forms of "degeneration" observed were mosaic, leaf roll and dwarfing. A noticeable increase in all the mentioned diseases, scab and "Eisenfleckigkeit" appeared to result from the potash treatment.

NOTE: The results obtained are rather in opposition with those obtained by G. Rhode (Ernähr. Pflan. **31**(13–14): 237–243, 1935.)

Best, R. J.

Precipitation of the tobacco mosaic virus complex at its isoelectric point. Austral. Journ. Expt. Biol. & Med. Sci. **15** (1): 1–13, 1936.

Bessey, E. A.

Michigan State Board of Agric. Seventy-second Annual Report of the Secretary of the State Board of Agric. and Forty-sixth Annual Report of the Expt. Station from July 1, 1932 to June 30, **1933**: 314, 1933.

A brief note of work in progress.

Birkeland, Jorgen M.
Further serological studies of plant viruses. Ann. Appl. Biol. **22**(4) : 719–727, 1935.

These experiments indicate that the virus is, in itself, antigenic; that cucumber mosaic, tobacco ring spot and tobacco mosaic are serologically distinct and that tobacco mosaic virus, aucuba mosaic virus (green and yellow strains), and probably tomato streak virus are serologically indistinguishable.

On the classification of plant viruses. Phytopathology **25**(5) : 456–458, 1936.

The results of studies which suggest that the serologic tests may be useful in the classification of viruses.

Bitancourt, A[gegislan]
Um protozoario parasita do Cafeeiro. (A protozoon parasitic on coffee) Rev. Inst. Café **10**(107) : 2486–2490, 1935.

The author reports a cochineal insect (*Cerococcus parahybensis*) and the protozoon *Rhyzoecus coffeae* associated with coffee *phloem necrosis*. The paper is not strictly on virus, but as he discusses Stahel's observations on the subject we decided to include this citation considering it of interest to the students on the subject.

Black, L. M.
Some insect and host relationship of the potato yellow dwarf virus. Phytopathology (Abstract) **26**(2) : 87, 1936.

Abstract of paper read before the 27th Annual Meeting of the American Phytopathological Society, St. Louis, Mo. Dec., 1935. *Aceratagallia sanguinolenta* is a vector and *Trifolium pratense* is a host plant.

Blank, L. M.
A mosaic on cabbage in Wisconsin. Phytopathology (Abstract) **25**(1) : 6, 1935.

This paper appeared in our First Supplement under Black, L. M.

Blattny C[tibor Eugen Marie Karel], & Vukolov, V.
Nakazliva neplodnost Chmele (Infectious sterility of the hop.) Rec. Inst. Rech. Agron. Rep. Tchecosl. 1936, **137** : 3–18, 1935.

Account of the author's studies since 1924 of the hereditary or infectious sterility of hops in Czecho-Slovakia. The disease is well described showing an extensive phloem necrosis of all the non-lignified organs. The work on transmission is also described and is attributed to a virus that may be of a complex nature suggesting that it may have originated from the disassociation of the virus of the "Kaderavost" disease.

Ozdravovaci pokus se sorton Bramború "Prazské rohliky". (An attempt to restore the health of the potato variety "Prazske Rohlíky.) Rec. Inst. Rech. Agron. Rép. Tchecosl. 1935, **137**: 33–38, 1935.

Account of the author's eight years work trying to free a potato variety from virus diseases.

Prispevek K lécení virovych chorob Bramború. (Contribution to the therapy of the virus diseases of the potato.) Rec. Inst. Rech. Agron. Rép. Tchécosl. 1935, **137**: 39–42, 1935.

Brief report of an experiment in trying to cure virus diseases by therapeutical methods.

Pokus o vlivu zavlahy a vlivu doby sázeni na zdravotni stav Bramború. (Experiment on the influence of watering and of date of sowing on the health of potatoes.) Rec. Inst. Rech. Agron. Rép Tchécosl. 1935, **137**: 43–47, 1935.

The author reports the results of his experiments on watering and time of planting potatoes. Late planting and over-watering reduced virus diseases (leaf roll crinkle, mosaic and stipple-streak). A noticeable reduction of the number of aphids was demonstrated, to it was attributed the success in reducing the spread of the disease. Experimental work in regard to aphid control was also conducted with derris and pyrethrum powder.

---, **& Vukolov, V.**

Studie Z pathologie chmele a Bramború (Pathological studies on hop and potato.) Sbornik Vyzkumnych u. 1 tavú zemedelskych C.S.R. Svazek **137**, 47 p., 1935.

Contains some notes on virus diseases of potatoes and hops.

Blood, H[erbert] L[oren]

An unusual occurrence of "spotted wilt" of tomato in Utah. U. S. Dept. Agric. Plant Disease Rep. **20**(9): 143–144, 1936.

A record.

Bodine, E. W.

Peach mosaic disease in Colorado. Colorado Agric. Expt. Sta. Bull. **421**, 11 p., 1936.

A description of the disease and recommendations for its control.

Boss, Andrew

Forty-first Minnesota Agric. Expt. Sta. Ann. Rpt. July 1, 1932 to June 30, **1934**: 7, 1934.

Brandes, E[lmer] W[alker,] & Matz J[ulius]

Recovery of the sugar cane plant from the mosaic disease. Paper presented to 5th Congress of the International Association of Sugar Cane Tech. (Facts About Sugar (Abstract) **30**(11): 425, 1935.)

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Importance of the virus diseases of sugar cane. Proc. Fifth Congress Int. Soc. Sugar Cane Tech. Brisbane, Australia p. 87–105, 1936.

A very excellent review of the subject including descriptions of the diseases and methods of control.

Transmission of new types of sugar cane mosaic and some observations on significance of the diseases. Proc. Fifth Congress Int. Soc. Sugar Cane Tech. Brisbane, Australia, p. 804–811, 1936.

This may be considered a progress report. It contains a careful and thorough discussion of the methods of work.

Brentzel, W. E.

Types of potato virus diseases in North Dakota. North Dakota Agric. Expt. Sta. Bull. **282**, 23 p., 1935.

Popular.

Caldwell, John

Spurious cucumber "mosaic" due to copper poisoning. Journ. Min. Agric. Great Britain **42**(2): 97–98, 1935.

A description.

On the interactions of two strains of a plant virus: Experiments on induced immunity in plants. Royal Soc. (London), Proc. Ser. **B**: 117, 1935, No. **B–803**: 120–139, 1935.

The author reports two strains of the virus of the aucuba mosaic of tomato. A. G. causes a green mottling and A. Y. causes a yellow mottling. The yellow strain is similar to Johnson's tobacco virus No. 6, but both show some differences.

Caminha, A.

Co. 290 cane at Campos, Brazil. Observations on cane culture in Brazil. Brazil Assuc. **5**(3): 127–138; (4): 335–341, 1935. (Facts About Sugar (Abstract) **30**(8): 304–305, 1935.)

Account of variety resistance to mosaic.

Carsner, Eubanks

Results from U. S. No. 1 resistant beet seed. Facts About Sugar **30**(2): 70, 1935.

Brief popular notes on yields.

Carter, Walter

Mealy-bug wilt and green spot in Jamaica and Central America. Phytopathology **24**(4) : 424–426, 1934.

The Smooth Cayenne pineapple appears to have disappeared as a result of the wilt and the Red Ripley is becoming scarce.

The symbionts of *Pseudococcus brevipes* (Ckl.) Ann. Ent. Soc. Amer. **28**(1) : 60–64, 1934.

This paper is of interest because this insect is a vector of pineapple wilt which is similar to the virus diseases.

Mass action phenomena in mealybug wilt. Ann. Ent. Soc. Amer. **28**(3) : 396–403, 1935.

This paper is of interest because this disease is very similar to the virus diseases.

Studies on biological control of *Pseudoccus brevipes* (Ckl.) in Jamaica and Central America. Journ. Econ. Ent. **28**(6) : 1037–1041, 1935.

This paper is of interest to students of virus diseases because this insect is a vector of pineapple wilt.

Insects and Plant diseases (Presidential Address). Proc. Hawaii Ent. Soc. **9**(2) : 159–170, 1935.

A popular discussion on the insect transmission of virus diseases and virus-like diseases of plants.

Mechanical transmission of two viruses to pineapple. Phytopathology (Abstract) **25**(1) : 10, 1935.

The toxicogenic and toxiniferous insect. Science **83** : 522, 1936.

A brief discussion which is of interest to students of virus diseases.

The symbionts of *Pseudococcus brevipes* in relation to a phytotoxic secretion of the insect. Phytopathology **26**(2) : 176–183, 1936.

Insects that are transferred from pineapple to *Panicum barbinode* loose the power to produce green spots on pineapple after a time. The symbiont is pleomorphic and passes from a rod to a *coccus* form. It does not regain the rod form after the insect is returned to the pineapple.

Cation, D[onald]
The role of plums in the spread of peach virus diseases. Ann. Rpt. State Hort. Soc. Michigan, **65**: 61–63, (1935), 1936.

Popular.

Caudwell, E. S.
Cane experiments at Umbogintwini. Sugar and Cotton Planter, **II**(6): 7–9, 1926.

This paper is a record of a field test of streak of sugar-cane.

Chamberlain, E. E., & Taylor, G. G.
The occurrence of spotted-wilt of tomatoes in New Zealand. New Zealand Journ. Agric. **52**(1): 9–17, 1936.

Popular.

Sore-shin of blue lupins. New Zealand Journ. Agric. **51**(2): 86–92, 1935.

A disease that is very destructive on *Lupinus angustifolius*. It causes a mosaic of peas, broad bean and red clover. It is readily transmitted by *Aphis rumicis* and *Myzus persicae*. Experiments indicate that it is not transmitted by seeds. It overwinters in the red clover.

Chapman, G[eorge] H[enry]
Crack-neck: A non-parasitic disease of Chrysanthemums. Phytopathology **9**: 532–534, 1919.

It is possible that this is a virus disease.

Chester, K[enneth] S[tarr.]
Serological evidence in plant-virus classification. Phytopathology **25**(7): 686–701, 1935.

The author gives a historical review of the subject and methods. The results are summarized as follows: The test show the following virus types to represent distinct serological entities: tobacco mosaic, latent mosaic of potato, potato mild mosaic, potato aucuba mosaic, potato-vein-banding virus, tobacco ring spot, and Osborn's pea-mosaic virus No. 2.

From tobacco mosaic have been derived many strains of very close affinity serologically, although of very diverse symptomatology. The group of such uniformly interreactive viruses includes tobacco aucuba mosaic, Johnson's yellow tobacco virus 4, Holmes' symptomless tobacco mosaic, and many of Jensen's brilliant yellow, white, and slow-moving types.

The latent-mosaic virus of potato (X-virus or healthy-potato virus) is representative of a group of serologically closely related virus strains embracing potato mottle, potato ring spot, and British Queen streak. According to Birkeland's tests (5), spot necrosis and at-

tenuated spot necrosis also belong in the same group. Rugose-mosaic virus of potato reacts with both X-virus and vein-banding sera, confirming the present view that it is a mixture of these two virus types.

The vein-banding virus of potato and cucumber-mosaic virus are so strongly interreactive that these appear to be but strains of the same virus type.

This relationship is supported by infection tests. Valleau's tobacco virus 10729 also shows marked affinities with these viruses.

A much more distant serological relationship between tobacco mosaic and severe etch of tomato is indicated by precipitin tests.

Two viruses isolated from legumes by Osborn and tentatively referred to as pea-mosaic viruses No. 2 and No. 3 behave serologically as strains of the same virus type, although both are serologically distinct from all of the other viruses studied."

The antigenicity of the plant viruses. Phytopathology **25**(7): 702–714, 1935.

The author gives the results of extensive experiments and says: "From these findings, as well as from the facts previously reported concerning virus neutralization, the possibility of arriving at a logical classification of viruses by means of serological reactions, and the correlation between strength of serological reactions and the amount of infective material present in tests samples, it is concluded that the evidence now available is sufficiently strong to warrant the assumption that the antigens responsible for the plant virus serological reactions thus far studied are the viruses themselves and not normal or derived constituents of diseased plants."

A serological estimate of the absolute concentration of tobacco mosaic virus. Science **82**(2114): 17, 1935.

After a brief review of the work of other students the author concludes "that a single animal dose on *N. glutinosa* corresponds to 60–600 million molecules of virus antigen."

Choudina, I.

(Virus diseases of tobacco in the U.S.S.R. and methods for their control.) Trans. Lenin Acad. Agric. Sci. **1936**: 32–41, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. A Discussion of the known diseases, most of which are known in the United States. The speck spot of tobacco is transmitted in the seeds. Recommendations for control.

Chu, H. S.

On the mosaic disease of wheat. Entom. & Phytopath. Hangschow, China **4**(2): 22–27, 1936.

Conners, I. L.

Fourth Annual Report of the Canadian Plant Disease Survey, 116 p., 1935.

In this report is included the new record for Canada on a mosaic on seed mangolds and on Swiss chard. Also a new mosaic disease on cherry.

Cook, Melville T[hurston]

A mosaic disease of *Tithonia rotundifolia*. Phytopathology **26** (2) : 90, 1936.

Abstract of paper read before the 27th Annual meeting of the American Phytopathological Society, St. Louis, Mo., Dec., 1935. The host plant was incorrectly determined. It was *T. diversifolia*.

Index of the vectors of virus diseases of plants. Journ. Agric. Univ. Puerto Rico, **19**(3) : 407–420, 1935.

A list of vectors arranged alphabetically. Under each vector is a list of the diseases which it transmit with date of first record, place and name of report.

Host index of virus diseases of plants. Journ. Agric. Univ. Puerto Rico, **19**(3) : 315–406, 1935.

A list of virus diseases that have been reported, arranged according to families, genera and species.

Phloem necrosis in the stripe disease of corn. Phytopathology **26**(2) : 90, 1936.

Abstract of paper read before the 27th Annual meeting of the American Phytopathological Society, St. Louis, Mo., Dec., 1935.

Cooley, L. M.

Virus-free raspberries. Rural New York, **94**: 385, 1935.

Popular.

The identity of raspberry mosaics. Phytopathology **26**(1) : 44–56, 1936.

The author gives the results of studies and recommends the use of two terms to include all raspberry mosaics,—green mottle mosaic and yellow mosaic.

Corneli, E.

Mal del mosaico su patate (Mosaic disease of potato.) Rilievi Fitopt. Lab. & Osser. Pat. Veg. R. Inst. Sup. Agr. di Perugia, Memoria **26**: 61, 1933.

Brief popular note.

Costantin, Julian [Noel]

Experiences culturales sur la pomme de terre dans les Pyrénés. Compt. Rend. Acad. Sci. (Paris) **198**: 22–26, 1934.

Notion nouvelle de l'Erulement doux de la pomme de terre. Compt. Rend. Acad. Sci. (Paris) **198**: 299–302, 1934.

Extériorisation des dégénérescences par l'action de l'altitude, Compt. Rend. Acad. Sci. (Paris) **198**: 1095–1097, 1934.

Influence des hautes latitudes sur les rendements agricoles de la pomme de terre dans l'Amérique du Nord. Compt. Rend. Acad. Sci. (Paris) **199**: 690–694, 1934.

Culture de la pomme de terre au Maroc en 1933. Compt. Rend. Acad. Agric. Sci. (Paris) **20**: 146, 1934.

L' enroulement de la variété de Pomme de terre Belle de Juillet. (Leaf roll in the Belle de Juillet potato variety.) Compt. Rend. Acad. Sci. (Paris) **201**(23): 1080–1083, 1935.

The author states that Belle de Juillet potato variety suffer to the extent of 100 per cent from leaf roll in low-lying situations. He gives details of his experiments to cure leaf roll and mosaic at high altitudes in the Pyrenees, at 1,400 m. above sea level.

---, **& Magrou, J[oseph]**

Étude des mycorhizes de la Pomme de Terre sur des pieds sains et sur des pieds atteints de mosaïque. (Study of potato mycorrhiza on healthy plants and on plants affected with mosaic.) Rev. Path. Vég. **22**(1): 60–62, 1935.

Report of the behavior of potato varieties at different altitudes and affected with mosaic and its reaction to mycorrhiza.

Cotton, A[rthur] D[isbrowe]

The aphis carrying lily mosaic. Royal Hort. Soc. Lily Year-Book **3**: 89–91, 1934.

Aphis gossypii is only vector known. It is less abundant in Great Britain than in the U. S. which may account for a less rapid spread.

Cottrell-Dormer, W.

The variability of plant pathogens. Proc. Fifth Congress Soc. Sugar Cane Tech. Brisbane, Australia, p. 713–722, 1936.

This paper contains a brief discussion of variability in viruses.

Cristinzio, M.

Le virosi delle Patate Riccia e Biancona di Napoli nell' annata 1934. (The virus diseases of Napolitan Riccia and Biancona potatoes in the year 1934.) Ric. Ossvz. Divulg. Fitopat. Campania ed Mezzogiorno (Portici) **4**: 51–65, 1935.

Account of reduction in potato yields during 1934 due to several virus diseases.

Cross, W[illiam] E[rnest]

Ensayos y observaciones relativos al efecto del mosaico sobre los rendimientos culturales de las variedades P.O.J. 36, 213 y 2725. (Tests and observations in regard to the effects of mosaic on the cultural yields of the varieties P.O.J. 36, 213 and 2725.) Rev. Indust. Agric. (Tucumán) **24**(3–4) : 57–76, 1934.

Report of the tests conducted and discussion on the observations. The author declares, that practically, no loss of productivity, is suffered in the province on the three mentioned varieties due to the acquired tolerance after twenty years of cultivation.

Cunha Bayma, A. da

(Mosaic disease of sugar cane in the State of Ceara, (Brazil) Campo (Río de Janeiro) **4**(7) : 74–78, 1933.

The disease spread from certain plantations. Infection ranges from 30 to 100 per cent, and there is a decrease of 80 per cent in sugar productions. Steps have been taken to introduce resistant varieties.

Curzi, M[ario]

Le malattie da virus delle piante. Ann. Tec. Agric. (Rome) **7**: 183–196, 257–272, 423–442, 1934.

Dale, H. H.

Viruses and heterogenesis. An old problem in a new form. Huxley Mem. Lect. 24 p., 1935.

A summary of the filterable virus problem. The author believes that further studies will result in a biogenesis explanation of the problem.

Dana, B[liss] F.

Occurrence of curly top in Pacific Northwest in 1934. Plant Disease Reporter **18**(14) : 168–173, 1934.

Account of the unprecedented spread of curly top on different hosts.

Daniels, Leslie B.

The tomato psyllid and the control of psyllid yellows of potatoes. Colorado Agric. Expt. Sta. Bull. **410**, 1934.

A description of the diseases and recommendations for its control.

Davies, W. Maldwyn

Ecological studies on aphides infesting the potato crop. Bull. Ent. Res. **23**(4) : 535–548, 1932.

This is not a paper on virus diseases but it may be of interest to some of the students on insect vectors.

Studies on aphides infesting the potato crop II. Aphids survey: its bearing upon the selection of districts for seed potato production. Ann. Appl. Biol. **21**(2): 283–299, 1934.

This paper contains a brief discussion of the relations of *Myzus persicae* to virus diseases.

Studies on aphides infesting the potato crop. III. Effect of variation in relative humidity on the flight of *Myzus persicae* Sulz. Ann. Appl. Biol. **22**(1): 106–115, 1935.

Contains a brief reference to virus diseases.

---,**& Whitehead T[athan]**

Studies of aphides infesting the potato crop. IV. Notes as the migration and condition of alate *Myzus persicae* Sulz. Ann. Appl. Biol. **22**(3): 549–556, 1935.

A discussion of time and environmental conditions.

De Haan, K., & Roland, G.

Enquete internationale sur les différents types de maladies de jaunissement et de mosaïque de la Betterave sucriére quant á leurs caractéres et leur influence sur la végétation. (An international inquiry into the different types of yellowing and mosaic diseases of sugar beet in respect to their properties and influence on growth.) Publ. Inst. Belge Amélior. Better. **3**(2): 55–67, 1935.

Summary of the fifth meeting of the International Institute of Beet Research at Brussels in January 1935. Extensive data is given in regard to "yellowing" and mosaic.

Deighton, F. C.

Mycological work. Sierra Leona Dept. Agric. Rpt. **1933**: 14–20, 1935.

This report includes notes on cassava mosaic, giving the observations of two years experiments. Reports cases of apparent recovery and that the disease is not seed-borne.

Desai, S. V.

The antigenic properties of the sugar-cane mosaic virus. Curr. Sci. **3**(7): 28, 1935.

Serological studies.

Organisms associated with sugar cane mosaic, and their relation to the mosaic virus. Indian Journ. Agric. Sci. **5**(4): 367–386, 1935.

The author obtained a bacterial organism from mosaic of sugar cane. This was grown in culture and developed an invisible filter passing stage.

Dickson, B[ertram] T[homas]
Filterable viruses. Australian & New Zealand Assoc. Adv. Sci. Report, vol. **21**, 1933.

A review of the subject.

Dippenaar, B. J.
Fruit spots of the Kelsey and other plum varieties. Farming in South Africa March, 1932, p. 4, 1932.

Popular. Refers to sun-scorch, Kelsey spot and drough spot, cause unknown.

Dodds, H. H., & Beater, B. E.
Proc. South Africa Sugar Tech. Assoc. **1931**: 116, 1931.

Has some references to virus diseases of sugar cane.

———————, **& Fowlie, P.**
South African Sugar Tech. Assoc. Proc. **1932**: 38; **1934**: 89, 1934.

Has some references to virus diseases of sugar cane.

Doerr, R.
Die submicroscopischen Lebensformer. Verh. d. Schweiz. Naturf. Ges. 1929, II, Teil, 92, 1929.

This paper contains a discussion of tobacco mosaic virus.

Dounine, M. S.
(Virus diseases of leguminous crops.) Lenin Acad. Agric. Sci. Trans. **1936**: 59–68, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. A review of the subject and recommendations for control. *Epitetranyschus althaeae* is mentioned as a vector.

———————, **& Rischkow, V[itolij] L.**
(Aim and organization of scientific research work on virus diseases of plants in the U.S.S.R.) Lenin Acad. Agric. Sci. Trans. **1936**: 119–122, 1936.

This paper was read at the First Virological Conference, March 7–11, 1935, it was followed by resolutions on the report of (1) The nature of the viruses. (2) Virus diseases of potato. (3) Virus diseases of tobacco and makhorka. (4) Virus diseases of the cotton plant. (5) Virus diseases of *Leguminosae*. (6) Virus diseases of vegetables. (7) Aim and organization of work regarding virus diseases of plants in U. S. S. R. All of the above was in Russian without English summary.

Duggar, B[enjamin] M[inge], & Easley, Tildon
Comparative effects of certain aldehydes on the viruses of typical tobacco mosaic and tobacco ring spot. Amer. Journ. Bot. **22**(10): 912, 1935.

Abstract of a paper read before the Botanical Society of America.

Dykstra, T[heodore] P[eter]

A top-necrosis virus found in some apparently "healthy" potatoes. Phytopathology **25**(12): 1115–1116, 1935.

The author gives a brief review of the work of several writers and says: "It is believed that the virus component found in apparently healthy tubers of some American varieties in addition to virus X, is the same as Bawden's virus B."

. Cooperative studies of some European and American potato viroses. Phytopathology **26**(6): 597–606, 1936.

Comparative studies of European and American viruses showed that X virus of European potatoes was similar to the so-called latent virus of "healthy" American potatoes. The Y virus, and the vein-banding virus (rugose mosaic complex minus the X component) caused banding of veins on tobacco leaves. These two viruses belong to the same group but are not identical. Paracrinkle of Europe does not resemble leaf-rolling mosaic or any other known American potato virus. Crinkle A of Europe is not the same as rugose mosaic in America. Virus C does not resemble any of the known American viruses.

Edgerton, C[laude] W[ilbur], & Tims, E. C.

Testing canes for disease resistances in Louisiana. Proc. Fifth Congress Int. Soc. Sugar Cane Tech., Brisbane, Australia, **1935**: 494–497, 1936.

This paper contains some discussion of methods for testing for mosaic.

Edwards, E. T.

Witches' broom: a new virus disease of Lucerne. Journ. Austr. Inst. Agric. Sci. **1**(1): 31–32, 1935.

A description of this disease which is commonly known as spindle shoot, mistletoe, bunchy-top and kurrajong.

Ehrke, G.

Untersuchungen über die Eisenfleckigkeit der Kartoffel. (Investigations on "Eisenfleckigkeit" of the potato.) Biochem Zeitung, **278**(3–4): 195–225, 1935.

In this rather extensive and comprehensive study the author gives the results of his observations and experiments.

Untersuchungen über die Stoffwechselvorgänge in Eisenfleckigen Kartoffeln. (Investigations on the metabolic processes in "Eisenfleckingen" potatoes.) Angew Bot. **17**(6): 453–483, 1935.

Emmerez de Charmoy, D[onald] d'

La lutte contre la mosaïque de la canne á sucre á l'Ile de la Réunion. (Control of sugar-cane mosaic in the island of Réunion.) Rev. Agric. Maurice, **83**: 158–163, 1935.

Control by replacing infested areas with resistant varieties.

Esau, Katherine,
Initial localization and subsequent spread of curly top symptoms in the sugar beet. Hilgardia **9**(8) : 397–431, 1935.

A very thorough study of the histology of diseased plants of various ages.

Esmarch, F.
Die Eisenfleckigkeit der Kartoffeln (''Eisenfleckigkeit'' of potatoes.) Kranke Pflanze **12**(1) : 7–10. 1935.

Contains information of ''Eisenfleckigkeit'' of potatoes with special reference to the investigations of Meyer-Hermann in Germany.

Esnault, O.
Les maladies dégénérescence de la pomme de terre. (Potato degeneration diseases), Vie. Agric. Rur. **24**(41) : 235, 1935.

Popular.

Fawcett, G[eorge] L[orenzo]
Notas preliminares sobre una enfermedad del tabaco (Preliminary notes on a tobacco disease). Rev. Indust. y Agric. de (Tucumán) **12** : 5–17, 1921.

Fernandes, D. S.
Voorloopige mededeeling over dede oorzaak van de Zeefvatenziekte (phloemnecrose) bij de Liberiakoffie an have bestrijding (Preliminary note on the cause of the sieve-tube disease (phloem necrosis) of Liberian Coffee and its control. Meded. Landbouwproefstat. Surinam 2, 12 p.. 1928.

A physiological study. No causal organism was found.

Findlay, A. J.
Annual Report of the Department of Agriculture, (Zanzibar), 1934, 32 p., 1935.

This report includes notes on cassava mosaic.

Folsom, Donald
Potato virus diseases, in 1933. Amer. Potato Journ. **11**(9) : 235–242, 1934.

Bibliography of recent literature.

Potato virous diseases in 1934. Amer. Potato Journ. **12**(11) : 304–310, 1935.

A brief statement of recent literature and bibliography of recent publication.

---, **& Bonde, Reiner**
List of distinct potato viroses. Amer. Potato Journ. **13**(1) : 14–16, 1936.

The authors give a list of 26 virus diseases which are apparently due to 26 distinct viruses. An excellent resumé.

Franklin, H[enry] J[ames]

False blossom, the most destructive cranberry disease. Mass. State Coll. Ext. Leaflet **154**, 8 p., 1935.

Popular.

Fukushi, Teikichi

Multiplication of Virus in its Insect Vector. Proc. Imp. Acad. **11**(7) : 301–303, 1935.

The experiments were made with *Nephotettix apicalis* var. *cincticeps* which is a vector of the dwarf disease of rice. The author had previously demonstrated that virus was transmitted through the egg and three generations. A female was selected for this experiments. She transmitted the disease to 38 plants on which she had been confined for 24 hours on consecutive days and to at least 15 eggs. The progeny of these eggs transmitted the disease to 201 healthy plants. An egg weighs 0.06 milligrams. The author states that this transmission can hardly be explained without assuming a multiplication of the virus.

Galloway, L. D.

India: new plant diseases recorded in 1934. Int. Bull. Plant. Protect. **9**(8) : 176–178; (11) : 268, 1935.

Among the new plant diseases reported during 1934 is a mosaic of *Elettaria cardamomum*.

Garbowski, L[udwik]

Choroby roslin uzytkowych w okresie 1931–1933 r. Zestawienie notowan Zakkla6ow Ochrony Roslin. (Diseases of useful plants in the period 1931–33. A summary of the observations of the Plant Protection Stations.) Rozn. Ochr. Rosl. Cz. A. (Choroby Roslin) 1931–33, **2** : 406–580, 1935.

This report includes a list arranged by host of many plants affected with virus diseases.

Gardner, John S.

Tuber-indexing of potatoes made easy. Ohio Veg. Grow. Assoc. **19** : 144–148, 1934.

Ghimpu, V.

Infinitul mic in patologia vegetal: ultravirusurile fitopathoege. (The infinitely small in plant pathology: plant pathogenic ultraviruses). Viata Agric. **5**, 10 p., 1935.

A semi-popular review.

Gigante, R[oberto]

La maculatura grigia interna dei tuberi di patata. Boll. R. Staz. Patol. Veg. (Roma) Firenze n. s. **14** : 256–267, 1934.

II mosaic della Zucca. (Mosaic of vegetable marrow.) Boll. R. Staz. Pat. Veg. (Rome) **14**(4) : 503–530, 1934.

A description of the disease which is transmitted by *Aphis gossypii*.

Prime ricerche sul comportamento di alcune varietá di patate italiane di fronte ai virus. (First reasearch on the behavior of some italian potato varieties to virus.) Boll. R. Stat. Pat. Veg. n. s. **15**(4) : 533–547, 1935.

Preliminary report on his observations on the behavior of some potato varieties to virus diseases.

Secondo contributo alla conoscenza della necrosi del cuore dei tuberi di patata (Second contribution to the knowledge of the heart necrosis of the potato tuber) Bol. R. Stat. Pat. Veg. **15**(4) : 555–560, 1935.

The observations made by the author on experimental plots lead him to the conclussion that heart necrosis of the potato is hereditary; he also concludes that the experiments gave negative results in trying to find out if the disease was of the virus group.

Gilliat, F. C.

False blossom disease and insect pests of the cranberry. Ann. Rpt. Nova Scotia Fruit Grower Asso. **71** : 52–55, 1934.

Goidánich, G.

La leptonecrosi dei Ciliegi e degli Albicocchi. (Leptonecrosis of cherries and apricots.) Boll. R. Stat. Pat. Veg. (Rome) n. s. **14**(4) : 531–540. 1934.

This disease presents resemblance to plum leptonecrosis. Although it is not definitely proved that it is a virus disease we decided to include it due to its similarity and interest to students on the subject.

Golding, F. D.

A probable vector of Cassava mosaic in Southern Nigeria. Trop. Agric. (Trinidad) **12**(8) : 215, 1935.

Bemisia nigeriensis is the vector.

Bemisia nigeriensis Corb.. a vector of cassava mosaic in Southern Nigeria. Trop. Agric. (Trinidad) **13**(7) : 182–186, 1936.

Gould, N. K.

Hot water treatment of narcissus bulbs. Journ. Roy. Hort. Soc. **59**(1) : 78–81, 1934.

This paper refers to the yellow stripe disease but the results are not definite.

Stripe disease of daffodils. Journ. Royal Hort. Soc. **60**(11) : 492–500, 1935.

A very complete discussion of this disease. A virus disease.

Green, D. E.

A suspected virus disease of Peonies new to Great Britain, Gard. Chron. **98**(2543) : 213, 1935.

Probably the ringspot disease of France.

Green, R. G.

On the nature of filterable viruses. Science **82**:443–445, 1935.

The author concludes:

"From the very intensive investigations that have now been carried out on certain filterable viruses, their obligatively parasitic nature, their ultramicroscopic size and their intracellular specialization appear established. No characters have yet been discovered for filterable viruses that require an unique explanation. Their origin from visible microbes and their known characteristic properties are to be expected from our knowledge of the evolution of life under the conditions of parasitism."

Güssow, H[ans] T[heodor]

Seed potato certification. Canada Parliamentary Session 1924. Select Standing Committee on Agriculture and Colonization, 1924.

A history of the inspection and certification work in Canada and statement of results.

Hansford, C[lifford] G[erald]

Sugar cane diseases in Uganda. East African Agric. Journ. **1**(1):25–28, 1935.

A brief popular account is given of the local history, symptoms and control of sugar cane mosaic.

Hargreaves, E.

Rosette of *Arachis hypogea*. Ann. Rpt. Dept. Agric. (Sierra Leone) **1930**:27; **1931**:19; **1932**:19.

Entomological work: Sierra Leone Dept. Agric. Rept. 1933:12–14, 1935.

The author reports that dark-veined type of groundnut mosaic (a form of rosette) is transmissible by *Aphis laburni*.

Harrison, A[rthur] L.

Bean mosaic menaces important crop. Farm Research **2**(1):1. 3, 1935.

Popular.

Mosaic of the refugee bean. New York Agric. Expt. Sta. (Geneva) Bull, **656**, 19 p., 1935.

The author gives a description of the common bean mosaic on this variety. The mosaics of red clover, alsike clover, white sweet clover, alfalfa, peas and black medick are caused by distinct viruses and some of them will attack the bean causing a yellow mosaic. The common mosaic can be transmitted by pea aphid, potato aphid, bean aphid, cucumber aphid, cabbage aphid, chenopodium aphid, *Macrosiphium ambrosis* and an unidentifical species of mealy bug. "Altho many kinds of aphids will carry the disease from plant to plant, they are not very common in the bean fields." It is also transmitted in the seed. It can be controlled by the use of mosaic free seed, roguing and the use of immune varieties.

The physiology of bean mosaic. New York Agric. Expt. Sta. (Geneva) Tech. Bull. **235**, 48 p., 1935.

This bulletin is a record of extensive studies and contains much data. High temperature, formal-dehyde fumes and X-rays did not inactivate the virus in diseased seed. Transpiration was lower in diseased than healthy plants. Detached pods from diseased plants loose weight faster than those from healthy plants. Diseased plants are likely to be stunted and parts deformed. The symptom develops between 15 and 30 degrees C.

Transmission of bean mosaic. New York State Agric. Erpt. Sta. (Geneva) Tech. Bull. **236**, 19 p., 1935.

The bean mosaic has not been found on any legumes, other than beans, in the vicinity of Geneva, New York, with the exception of sweet clover and then on only one plant. The viruses causing the mosaic diseases of red clover (*Trifolium pratense*), alsike clover (*T. hybridum*), black medick (*Medicago lupulina*) and white sweet clover (*Melilotus alba*) were transmitted by *Illinoia pisi* to *Phaseolus vulgaris* and caused a yellow bean mosaic. The disease was transmitted through the seeds but the amount of transmission was irregular.

Harrison, K. A.

Cranberry disease. Canada Dept. Agric. Bull. n. s. **180**: 27–30, 1935.

Harter, L[eonard] L[ee]

Mosaic of lima beans. Phytopathology **26**(2): 91, 1936.

Abstract of paper read before the 27th Annual meeting of the American Phytopathological Society. St. Louis, Mo., Dec. 1935. The disease is different from the mosaic of *Phaseolus vulgaris*.

Hartzell, Albert

A study on peach yellows and its insect vector. Cont. Boyce Thompson Inst., **7**: 183–207, 1935.

The author gives a very complete review of the subject and the results of his own work. He found that both nymphs and adults of *Macropsis trimaculata* transmit the disease.

Hedrick, Ulysses P.

Forty-fourth annual report for the fiscal year ended June 30, 1935. Division of Botany. Diseases of small fruits in Western New York. New York State Agric. Expt. Sta. (Geneva) Ann. Rpt. **45**: 30–31, 1936.

In this report the following subjects are briefly discussed: I. Control of virus diseases in black raspberries. II. Wild red raspberries as virus source. III. Mosaic in purple raspberries. IV. Delayed spring foliation of black raspberries caused by mosaics. V. "June yellows" in straw-berries.

Henderson, W. J.

Yellow dwarf, a virus disease of onions, and its control. Iowa Sta. Res. Bull. **188**: 209–255, 1935.

A description of this diseases which is very important. It is transmitted by *Aphis maidis, A. rumicis* and *Rhopalosiphum prunifoliae.* It was successfully transmitted by inoculation into *Narcissus tazetta, N. jonquilla* and *Allium ascalonicum.*

Henry, A. W.

Common potato diseases and their control. Alberta, College of Agric. Expt. Circ. **15**, 1934.

Herbert, D. A.

Bitter pit in apples: the crushed cell theory. Phytopathology **12**: 489–491, 1922.

The author claims that the crushed cell theory does not give a satisfactory explanation.

Hiltner, L[orenzo]

Beiträge zur ernährunge. Physiologie der kartoffel unter besonderen berüchsichtigun des Abbauproblems. Rept. Blätt. Pflanzb. u. Pflanzensch. (Freising), **34**: 206–219, 1934.

Hirayama, S., & Yuasa, A.

Cytological study of tobacco mosaic I.—Ann. Phytopath. Soc. Japan **5**(3): 197–205, 1935.

The authors give in this paper the results of their observations and studies. As conclusion, they state that all tissue examined from tobacco plants affected with mosaic contained X bodies and other inclusions.

Ho, W. T. H., & Li, L. Y.

Preliminary notes on the virus diseases of some economic plants in Kwangtung Province. Lingnan Sci. Journ. **15**(1): 67, 68, 1936.

Account of several virus diseases occurring in Kwangtung, China.

Hoggan, Ismé A[ldyth]

Transmissibility by aphids of tobacco mosaic virus from different hosts. Journ. Agric. Res. **49**(12): 1135–1142, 1934.

Myzus pseudosolani, M. persicae and *Macrosiphum solanifolii* were tested to determine ability to transmit ordinary tobacco mosaic virus from 18 hosts plants. It was transmitted regularly from *Lycopersicum esculentum* and *L. pimpinellifolium,* and occasionally from others. *M. pseudosolani* was most efficient and *M. persicae* least efficient. A brief summary of Dr. Hoggans' work in Wisconsin.

———, & Johnson, James

A virus of crucifers and other hosts. Phytopathology **25**(6): 640–644, 1935.

A description of a disease that was transmissible to several crucifer, *Nicotiana tabacum, N. glutinosum, Lycopersicon pimpinellifolium* and *Spinacia oleracea; Myzus persicae* and *Brevicoryne brassicae* are vectors.

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Behavior of ordinary tobacco mosaic virus in the soil. Journ. Agric. Res. **52**(4) : 271–294, 1936.

Hollaender, A., & Duggar, B[enjamin] M[inge]
Irriadiation of plant viruses and of microorganism with monochromatic light, III Resistance of the virus of typical tobacco mosaic and *Escherichia coli* to radiation from lambda 3000 to lambda 2250 A. Proc. Nat. Acad. Sci. **22** : 19–24. 1936.

Hopkins, J[ohn] C[ollier] F[rederick]
Leaf spotting of tobacco caused by mosaic. Bull. **753**, 1929. (Also published in Rhodesia Agric. Journ. Issued by the authority of the Minister of Agric. of Rhodesia.)
Popular.

Field control of frenching in tobacco. Bull. **784**, 8 p., 1930. (Also published in Rhodesia Agric. Journ. Issued by the Minister of Agric. of Rhodesia.)
Popular. This is not a virus disease but has been confused with the mosaic of tobacco so often that it is included in the bibliography.

Further notes on leaf curl of tobacco. Bull. **861**, 8 p., 1932. (Also published by authority of the Minister of Agriculture of Rhodesia.)
Popular.

Mycological Notes: Seasonal Notes on Tobacco diseases. 8. The mosaic mystery. Bull. **942**, 1935. (Rhodesia Agric. Journ. **32**(2) : 108–113, 1935.)
Popular.

Annual Report of the Branch of Plant Pathology for the year ending 31st. Dec., 1934. Rhodesia Agric. Journ. **32**(6) : 397–405, 1935.

Hungerford, Cha[rle]s W[illiam]
Curly top of vegetables in Idaho. Plant Disease Reporter **18** (14) : 173–174, 1934.
The author states that in 1934 the virulence of curly top surpassed all records at the Idaho Experiment Station. Gives detail of losses due to the disease.

Hyde, R. R.
An interpretation of the filterable viruses. Amer. Journ. Hyg. **21**(2) : 472–481. 1935.
The author lists 20 virus diseases, including tobacco mosaic, which should be placed in one group because of the formation of inclusion bodies in all of them and because they will pass a filter. He believes them to be living.

Ingram, J. W., & Summers, Eaton M.
Transmission of sugar cane mosaic by the rusty plum aphid, *Hysteroneura setariae*. Journ. Agric. Res. **52**(11): 879–887, 1936.

Until 1933 *Aphis maidis* had been the only proved vector of sugar cane mosaic, but preliminary experiments in that year showed that the rusty plum aphid (*Hysteroneura setariae*) was also capable of transmitting the disease. The authors gives the distribution of the insect and details of their experiments.

Jehle, R[obert] A[ndrew.] & Henberger, J. W.
Potato seed maintenance studies in Maryland. Maryland Agric. Expt. Sta. Bull. **361**: 345–356, 1934.

Jensen, Hj.
Zickten van de tabak in Vorstenland. Proefstat. Vorstenland. Tabak Bull. **40**: 1–147, 1920.

Jensen James, H.
Studies on the origin of yellow viruses. Phytopathology **26**(3): 266–267, 1936.

The author obtained 51 strains of yellow mosaic from tobacco mosaic. This strains have arisen in a manner similar to mutations.

Notes on the present sugar cane-disease situation in Puerto Rico. Agric. Notes, Puerto Rico Agric. Expt. Sta. (Mayagüez) **68**: 1–8, 1936.

The results of a survey. Most of this paper is devoted to the mosaic situation.

Johnson E[dward] M[arshall]. & Valleau, W[illiam] D[orney]
Are tobacco plants affected with mild mosaic susceptible to other strains of the virus. Phytopathology **26**(2): 96, 1936.

Abstract of paper read before the 27th meeting of the American Phytopathological Society, St. Louis, Mo., Dec., 1935. "The tests indicate that protection may be afforded individual cells or group of cells because they probably are completely occupied by the first virus, but the plant as a whole does not develop immunity."

An example of spread of veinbanding from potatoes to tobacco. Phytopathology, **25**(6): 650–652, 1935.

A demonstration that this disease is transmitted from potatoes to tobacco.

Johnson, Folke, & Jones, L[eon] K[ilby]
Virus diseases of peas. Phytopathology **26**(2): 96, 1935.

Abstract of paper read before 27th Annual meeting of the American Phytopathological Society, St. Louis, Mo., Dec., 1935. Common mosaic and severe mosaic of the common pea belong to the sprenkel and marmon types of Merkel. Cross inoculations demonstrated a large number of leguminous hosts. These diseases are rarely transmitted through the seeds.

Johnson, Frank H.

Cultural studies of the virus of tobacco mosaic. Phytopathology **25**(11) : 1035–1037, 1935.

A record of experiments for the culturing of the virus of tobacco mosaic. Many tests were made and only one gave positive results and this was not duplicated.

Johnson, James

Nomenclature of plant viruses. Int. Bot. Cong. Proc. **2** : 193–195, 1935.

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Tobacco streak, a virus disease. Phytopathology **26**(3) : 285–292, 1936.

This disease is due to a virus. The virus is relatively sensitive. It withstands aging less than 36 hours, the thermal death point is 53°C., and it is tolerant to dilutions of less than 1 to 30.

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A tobacco hybrid useful for virus studies. Amer. Journ. Bot. **23**(1) : 40–46, 1936.

This is a cross between *Nicotiana tabacum* and *N. glutinosa*. It resembles *N. tabacum* in its morphological characters but appears to be completely sterile. The reaction to the virus of ordinary tobacco mosaic is that of *N. glutinosa*. The virus can be transmitted to the hybrid by aphids. The most favorable temperature is 22–24 degrees C. There is evidence of invasion to some extent through the stomata.

Jones, G. Howard

Egyptian plant diseases: a summary of research and control. Ministry of Agric. Egypt. Tech. & Scientific Ser. (Mycol. Sec. Bull. **146**. 45 p., 1935.

Although this publication is not devoted to virus diseases it contains records of ten of these diseases. These records are of value in connection with the study of geographical distribution.

Jones, L[eon] K[irby], & Baur, Karl E.

Mosaic and related diseases of raspberries in Washington. Washington Agric. Expt. Sta. Bull. **324**, 19 p., 1936.

A well illustrated popular publication.

———————, **& Burnett, Grover**

Virus diseases of greenhouse-grown tomatoes. Bull. Washington Agric. Expt. Sta. **308**, 36 p., 1935.

A semi-popular publication containing much important data.

Kaho, H.

Zur Physiologie der Kartoffel. I Über die Permeabilität des Knollengewebes der vitalen und der abbaukranken Kartoffeln. (Contribution to the physiology of the potato. I. On the permeability of the tuber tissue of sound and degenerate potatoes.) Phytopath Zeitschr. **8**(2) : 157–164, 1935.

The author gives an account of his experiments in Estonia on potatoes suffering from degeneration in the form of mosaic, crinkle

and leaf roll. According to the experimental results it was showed that exosmosis was generally greater in the diseased than in the healthy tuber; that the cells of the diseased tubers have lower osmotic values than those of healthy ones and that the cells of diseased tubers are more permeable to water than those of healthy ones.

Zur Physiologie der Kartoffel. II. Ein Beiträg zur Diagnose abbankranker Knollen. (On the physiology of the potato. II. A contribution to the diagnosis of degenerate tuber.) Phytopath. Zeitschr. **8**(4) : 323–335, 1935.

Continuation of previous work, cited above.

Das Verhalten der Eiweisstoffe und abbaukranker Kartoffelknollen gegen Salze. (The reaction of the albumins of healthy and degenerate potato tubers to salts.) Bull. Phytopath. Exp. Sta. Univ. Tartu **31**, 22 p., 1935.

The author discusses and tabulates the results obtained in his experiments with healthy and degenerate (leaf roll, mosaic and crinkle) potato tubers as to the reaction to several salts and heat.

Kanngiesser,

Über netzpanaschierung bei *Oxalis acetosella*. Naturwiss. Wach. **12**, 1913.

Keeble, F.

Bitter pit. Nature, **98** : 137–138, 1916.

Klapp, E. L.

Scheinabbau, modifikationen und viruskrankheit. (Zur neuregelung der kartoffel-anerkennung.) Der Züchter **6** : 177–181, 1934.

Zusammenhänge von Standortseigenschaften, Viruserkrankung und Nachbauertrag der Kartoffel. (Connections between ecological properties, virus diseases and progeny yield of the potato.) Pflanzenbau **12**(5) : 163–191, 1935.

The present study is based on extensive experiments done by the writer in Germany. He observed the connection between the ecological influence and virus diseases and discusses his observations. He believes that virus diseases, inadequate ecological conditions and nutritional influences are important in the production of healthy seeds.

Klinkowski, M.

Die Bechholdsche Kupferprobe als diagnostisches Hilfsmittel zur Beurteilung des Gesundheitszustandes von Kartoffelknollen. (The Bechhold copper test as a diagnostic aid in the determination of the state of health of potato tubers.) Phytopath. Zeitschr. **8**(5) : 421–455, 1935.

Explanation of the method of Bechhold copper test for determining *degeneration* in potato tubers.

Knowlton, George F[ranklin]
The potato psyllid. Utah Agric. Expt. Sta. Leaflet **36**. 1934.

The beet leafhopper and curly-top. Utah Agric. Expt. Sta. Leaflet 8, 3 p., 1934.
Popular.

Kock, G.
Wie erklärt sich der Abbau der kartoffeln und wie läst er sich oerhinden. Der Pioner, Heft. **5**, 3 p., 1934.

Die bedentung der nicht-parasitäsen pflanzenkranheiten für die landwirtschaftliche. Praxis. Ldw. Fachpresse f. d. Czechoslovakia **12**: 107–108, 1934.

---, **& Greisenegger, K.**
Tatigkeitsbericht des Kartoffel-Fachausschussus über des Jahr 1934. (Report on the work of the Potato Expert Committee for the year 1934.) Neuheiten Pfl. Sch. **28** (1): 4–6, 1935.
In this report is added an unobserved form of mosaic-crinkle found in Petzenkirchen to the eight types of potatoes viruses previously recognized in Austria.

Köhler, E[rich]
Kartoffelabbau und viruskrankheiten. Mitt. Deut. Landw. Ges. **40**: 260–261, 1934. (Wiener Ldw. Ztg. **84**: 89, 1934.)

Mischinfektionen mit verschiedenen Stämmen des Ringmosaikvirus (X Virus-Gruppe.) der Kartoffel. (Untersuchungen über die Viruskrankheiten der Kartoffel. IV Mitteilung.) (Mixed infections with various strains of the ring mosaic virus (X virus group.) of the potato. (Investigations on the virus diseases of the potato. Note IV.) Angew Bot. **17** (1): 60–74, 1935.
Continuation of previous work by the author. In the present paper he gives his observation in regard to the reaction in inoculations of viruses of different strains.

Übertragungsversuche mit dem virus der Lupinenbraune. (Transmision experiments with the Lupin browning virus.) Angew. Bot. **17** (5): 277–286, 1935.
The results of experimental studies. The disease appears to be identical with the sore shin of New Zealand. It was transmitted to *Lupinus angustifolius, L. luteus* and to Samsum tobacco.

Über Umweltnachwirkungen bei einer vegetativ vermehrten Pflanze (Kartoffel. Angew Bot. **17** (5): 288–302. 1935.

Zur charakterisierung des ringmosaikvirus (X virus) der kartoffel. (The characteristics of the ring-mosaic viras (X virus) of potato. Int. Bot. Cong. Proc. **2**: 197–198, 1935.

Über die Variabilität des Ring mosaikvirus (X virus) der Kartoffel. (The variability of the virus of ring-mosaic (X virus) of potato.) Die Naturw. **23**(49) : 828–829, 1935.

The author gives his observations and experimental evidence. He confirms those of J. Johnson and Koch.

Die Viruskrankheiten der Kartoffel. (The virus diseases of potato.) Biol. Reichs. für Land-und Forst. Flugblätt **42**, 4 p., 1935.

Popular account and discussion.

Erfahrung beim feldmässigen Anbau von Künstlich blattrollinfizierten Kartoffeln. (Sorte Kl.-Sp. Wohltmann.) (Untersuchungen über die Viruskrankheiten der Kartoffel. V. Mitteilung.) ond. Arb. Biol. Reich. für Land-und Forst. **21** (4) : 517–529, 1935.

Account of Experimental results.

---, **& Hey, A.**

Untersuchungen an Kartoffelproken über die Beziechungen zwischen knollenpotential und Virusleefall. (Investigation on potato samples on the relations between tuber potential and virus infection) Zentbl, Bakt. 2 Abt., **91**(11–15) : 256–267, 1935.

The authors used tubers of different regions and found that when the tubers were cut in half and one part used for potential measurements and the other for the determination of virus infections, there was a correlation towards the definite end. The results are discussed.

Viruskrankheiten (Virus disease) Kranke Pflanze, **12**: (7–8) : 109–112, 1935.

A semipopular account of recent discoveries with special reference to cultivated plants.

Fortgeführte Untersuchungen über den kartoffelabbau. (Continued investigations on potato degeneration.) Landw. Jb. **80**(3) : 379–408, 1936.

This rather extensive comprehensive study is a contribution of previous investigations on the etiology of potato degeneration made by the author. He study different viruses and their behavior on different potato varieties and tobacco.

Koratshevsky, I.

(New data on the properties of the tomato mosaic virus.) Trans. Lenin Acad. Agric. Sciences, p. 82–91, 1936.

Paper read before the First Virological Conference. March 7–11, 1935. This is the leaf-fern virus No. 1, of the tobacco mosaic group. A discussion of reactions to chemicals.

The stolbur disease of plants. Trans. Lenin Acad. Agric. Sciences, **1936**: 99–111, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. (Eng. summary.) This disease attacks *Atropa belladonna, Datura stramonium, Convolvulus arvensis* and *Nicotiana tabacum.* Probably transmitted by *Thrips* sp. The disease is very severe. Methods of control are given.

Kozlowski, Antoni

Little leaf or rosette of fruit trees in California. Phytopathology **25**(2): 275–278, 1935.

A description of the disease which appears to be an exanthema.

Kunkel, L[ouis] O[tto]

Recent advances in studies on plant virus diseases. Rept. Soc. for Prot. of plants. **1932–34**: 23–22, 1934.

A review of studies on variant strains of tobacco mosaic virus and insect vectors.

Immunological studies on the three peach diseases, yellows, rosette and little peach. Phytopathology **26**(3): 201–219, 1936.

Descriptions are given of these diseases. Little peach and yellows do not give immunity against rosette, but each gives immunity against the other. Peach yellows and little peach are believed to be related but rosette is believed to be different.

Larue, P.

Études et vues nouvelles sur la chlorose dela vigne. Progr. Agr. et Vitic. **105**(16): 378–380, 1936.

Leach, J[ulian] G[ilbert]

Insects in relation to plant diseases. Bot. Rev. **1**(11): 448–466, 1935.

Two pages of this paper are devoted to a brief discussion of insects and virus diseases.

Lees, A[lan] H[enry]

Progress report on big bud and reversion of black currant. Univ. Bristol Ann. Rpt. Agric. and Hort. Res. Station **1923**: 69–72, 1923.

Lefevre, P.

Quelques considerations sur la "mosaïque du manioc" (Some considerations on cassava mosaic.) Bull. Agric. Congo Belge **26**(4): 442–447, 1935.

According to the author cassava mosaic was first described in 1895 by Dammer from East Africa. The author describes the behavior of the disease and its reaction to wood ashes and stable manure. He also states that bitter types of cassava are more susceptible than the sweet ones. The insect vector for cassava mosaic is given here as *Bemisia gossypiperda* var. *mosaicivecta.*

Lehman, S[amuel] G[eorge]
Soil contamination as a factor in crop infestation of tobacco mosaic. Journ. Elisha Mitchell Sci. Soc. **50**(1–2) : 44–45, 1934.

This is an abstract of a paper presented before the North Carolina Academy of Sciences, May 4–5, 1934.

Lemmon, Paul
Comparative studies on Metabolism of healthy and mosaic-infected tobacco leaves, Respiration studies. Amer. Journ. of Bot. **22**(10) : 912, 1935.

Abstract of a paper read before the Botanical Society of America.

List, George M.
Psyllid yellows of potatoes, with a preliminary report on the control of the insect *Paratrizoa cockerelli* Sulc. Journ. Colorado–Wyoming Acad. Sci. **1** : 74–75, 1934.

Loughnane, J[ames] B., & Clinch, Phyllis
Composition of interveinal mosaic of potatoes. Nature **135** (3420) : 833. 1935.

This disease is a complex of two viruses.

Lounsbury, C. P.
Tobacco wilt in the Kat River Valley. Agric. Journ. of Cape of Good Hope, **28** : 784–803, 1906.

Longley, L. E.
Flower in "broken" or mosaic tulips. Proc. Amer. Soc. Hort. Sci. **33** : 664–667, 1936.

Ludewig Karl,
Ueber die kroepoek-krankheit des Tabaks in Kamerum. Ber. Deutsch. Bit. Gesell **31** : 536–543, 1913.

Luthra, J. C., & Satter, A.
Some observations on the mosaic disease of sugar cane in the Punjab. Indian Journ. Agric. Sci. **5**(6) : 649–662, 1935.

Description of symptoms of the disease in the Punjab District of India. Discussion on the relative resistance of different varieties.

Magee, C[harles] J. P[atrick]
Spotted disease of lettuce and potatoes. Agric. Gaz. New South Wales **47**(2) : 99–100, 118, 1936.

The virus is transmitted by *Thrips tabaci* and *Frankliniella insularis*.

Bunchy top disease of bananas. Rehabilitation of the banana industry in New South Wales. Journ. Austral. Inst. Agric. Sci. **2**(1) : 13–16, 1936.

Mahoney, C. H.
Seed transmission of mosaic in inbred lines of muskmelons (*Cucumis melo* L.) Proc. Amer. Soc. Hort. Sci. 1934, **32** : 477–480, 1935.

Forty-eight inbred progenies were studied and six were found to show seed transmission. Three selections did not transmit the disease through the seeds.

Breeding snap beans for mosaic resistance. A progress report. Proc. Amer. Hort. Sci. 1934, **32**: 483–484, 1935.

A study on selection of varieties of *Phaseolus vulgaris.*

Malcolm, D. H.

Virus diseases of tobacco. Tasmanian Journ. Agric. **7**(2): 57–60, 1936.

Manil P.

L' etude sérologique des maladies á virus des végétaux. (The serological study of plant virus diseases.) Comp. Rend. Deusiéme Congr. Sci. Bruxelles p. 998–1004, 1935.

Address made by the author at Brussels in June 1935. He reviews and discusses the most recent advances in the serological study of filterable plant viruses.

Manns, T[homas] F[ranklin]

Peach yellows and little peach studies. Phytopathology **26**(2): 100, 1936.

Abstract of paper read before the 27th meeting of the American Phytopathological Society, St. Louis, Mo., Dec., 1935. The author gives the results of extensive studies. *Macropsis trimaculata* is widely distributed and the only vector found.

Marchionatto, Juan B., & Millán, R.

Certificación de la "semilla" de papa. (Potato seed certification) Bol. Minist. Agric. Argentina **36**(4): 301–312, 1934.

As an introduction, the authors give an account of quarantine regulations for the exclusion of potato diseases, with special reference to those of virus origin in Brazil, Uruguay and Argentine where virus diseases of potato are assuming great importance. Then quarantine provisions for Argentine are inserted.

Martin, F.

La dégénérescence de la Canne á sucre. (Degeneration of sugar cane.) Bull. Asso. Chim. Sucrérie & Distill. France & Colon, **52**: 643–661, 1935.

The author believes that degeneration of cane is due to the use of terminal slips for planting.

Martin, J[oseph] P[olkinghorne]

Sugar cane disease control in Hawaii through the modification of Agricultural practices. Proc. Fifth Congress of the Int. Soc. Sugar Cane Tech., Brisbane, Australia, **1935**: 205–210, 1936.

This paper includes discussions of chlorotic streak and mosaic. The author recommends selection and roguing.

---, **& Carpenter C[larence] W[illard]**

Testing cane varieties for diseases resistance in Hawaii. Proc. Fifth Congress Int. Soc. Sugar Cane Tech., **1935**: 519–521, 1936.

This paper contains a brief discussion of mosaic.

Chlorotic streak disease of sugar cane. Proc. Fifth Congress Int. Soc. Sugar-cane Tech., Brisbane, Australia, **1935**: 823–828, 1936.

A review of our knowledge of this disease and the recent studies by the author.

Martyn, E[ldred] B[ridgeman]

Report of the Botanical Division for the year 1932. Divisional Reports of Agric. British Guiana for the year **1932**: 117–121, 1934.

The author reports two types of petunia mosaic A & B. The latter read: "The very slow spread of mosaic on D. 625 sugar canes in British Guiana, where no control is practised and the infected fields have been continued to the fourth and fifth ratoons, in spite of which good yields have been maintained, indicates that this variety is definitely resistant."

"Liberian coffee from Demerara was affected with phloem necrosis (*Phytomonas leptovaronum*); until recently, only isolated bushes were attacked in British Guiana, but in 1932 a more extensive outbreak occurred in the North West Districts."

Matsumoto, Takashi

(Differentiation of the two petunia diseases by means of serological, cytological and inoculation experiments.) Botany and Zoology. **3**(5): 893–898, 1935.

The author reports two types of petunia mosaic A & B. The latter is the same as ordinary tobacco mosaic. A cannot be transmitted by inoculation with sap but can be transmitted by inserting small pieces of diseased leaves in the growing stems. They differ in serological reactions. A does not have inclusion bodies. The symptoms are very similar except that A caused a more pronounced symptom of "clearing of veins" in the early stages.

---, **& Hirane, Seüchi**

Immulogical studies of mosaic diseases. V. Microserological tesis as means of detecting the virus in a small area of mosaic tobacco plants. Journ. Soc. Trop. Agric. **7**: 346–350, 1935.

The results of very delicate micro-serological tests which are somewhat different from previous results.

(Serological Analysis of the infective agents causing tobacco mosaic with malformed flowers.) Trans. Nat. Hist. Soc. of Formosa **26**: 258–261, 1936.

In Japanese. A resumé in English reads: "In the course of the study of virus diseases the author found some peculiar mosaic to-

bacco plants bearing strikingly malformed flowers. It has been confirmed by the serological methods, particularly by "precipitin absorption", that the disease under consideration is the composite one due to the virus complex, i. e. common tobacco mosaic and potato mosaic. The disease is therefore identical or very closely related to the "tomato streak" which is caused by the combination of tomato mosaic and potato mosaic viruses, since the tobacco mosaic is proved to be identical with the tomato virus. The above relation has been confirmed by inoculation."

Matz, Julius

Relative infectivity of mosaic virus in the different parts of infected sugar-cane, Proc. Fifth Congress Int. Soc. Sugar cane Tech., Brisbane, Australia, 799–803, 1936.

The work recorded in this paper shows that the virus is not distributed equally throughout the plant and that all parts of the plant are not equally susceptible.

McClean, A[lan] P[ercy] D[ouglas,] & Halse, R. H.

Streak disease of sugar cane; its economic importance in S. Africa. Proc. South African Sugar Tech. Asso. 1936.

The authors give a brief history of this disease and the results of very careful studies to determine the importance of this disease.

Streak disease of sugar cane. Proc. Fifth Congress Int. Soc. Sugar Cane Tech. Brisbane, Australia, p. 812–822, 1936.

This paper contains a brief history of the disease, data on distribution, description and a very thorough discussion of the author's experimental studies.

The bunchy-top disease of the tomato. Host range of the bunchy-top virus. Farming in South Africa. **10**(112) : 302–303, 1935.

The disease has been transmitted to *Solanum aculeatissimum, S. aculeastrum, S. duplosinuatum, S. incanum, S. panduraeforme, S. nigrum, S. sodomaeum, Nicandra physaloides, Physalis angulata, P. viscosa, Solanum tuberosum, S. melongena* and *P. peruviana.* The symptoms were masked in *P. angulata* and *S. nigrum.*

Further investigations on the bunchy-top disease of tomatoes. Dept. of Agric. Union of S. Africa. Sci. Bull. **139**, 36 p., 1935.

The author gives a list of plants to which the disease was transmitted and a special study of the reactions of some of them. The virulence of the virus increases as a result of passage through tobacco but not through other Solanaceae. The author also gives the results of temperature studies and mixing of the virus with alcohol.

McDonald, I. M.

Tests of curly-top resistant beets. Facts About Sugar **25**(6): 212–214, 1935.

A study to determine resistant strains.

McGeorge, W. T.

Pahala blight and a comparison with other forms of chlorosis. Hawaiian Planters' Record **30**(2): 293–328, 1926.

This does not refer to virus diseases but is of interest in this connection.

McKinney, H[arold] H[all]

The antigenic properties of plant viruses. Science **82**(2125): 276–277, 1935.

The author agrees with Chester's conclussions in general but takes some exceptions to the interpretations.

The inhibiting influence of a virus on one of its mutants. Science **82**(2133): 463–464, 1935.

The author believes the yellow mosaic in a mutant of the common mosaic of that host. He discusses the immunization of plants by the use of viruses and concludes that a relatively large amount of the common mosaic virus prevents the establishment of the yellow mosaic virus.

Reaction of wheat varieties, selections and hybrids to mosaic and mosaic-rosette. U. S. Dept. Agric. Misc. mimeographed publication, 1935.

Evidence of virus mutation in the common mosaic of tobacco. Journ. Agric. Res. **51**(11): 951–981, 1935.

After discussing fully his experiments the author concludes that in view of the mutable nature of certain plant viruses, it is possible that viruses may be eventually isolated which will have both a prophylactic and curative effect and yet will not survive indefinitely in an active form in the plant.

McRae, W[illiam]

Report of the Imperial Mycologist. Scient. Rpts. Imper. Inst. Agric. Pusa (India) **1931–32**: 122–140, 1933.

This report includes a test of 25 varieties of sugar cane to determine resistance to mosaic.

Scheme for research in mosaic. Scient. Rpt. of the Imper. Inst. of Agric. Res. Pusa (India) **1932–33**; 1934.

McWhorter, Frank P[aden]

Some diseases of ornamentals in Oregon. Plant Dis. Reporter **19**(2): 18, 1935.

Some 20 per cent of the Calla lily (*Zantedeschia ethiopica*) plants in a Portland greenhouse are reported to be suffering from a mosaic presenting every characteristic of a typical virus disease.

----------, & **Milbrath, J. A.**

The interpretation of Oregon tip blight on a basis of causal viruses. Phytopathology (Abstract) **25**(9) : 897–898, 1935.

The properties and interpretation of tulip-breaking viruses. Phytopathology (Abstract) **25**(9) : 898, 1935.

Metzger, C. H.

Growing potatoes in Colorado. Colorado Agric. Expt. Sta. Bull. **412**, 1934.

Michailova, P. V.

(The pathological changes of generative tissues of the tomato plant affected of woodiness of the fruit.) Trans. Lenin Acad. Agric. Science, **1936**: 92–98, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. A study of the histology of plants with this disease.

Pathologico-anatomical changes in the tomato incident to development of woodiness of the fruit. Phytopathology **25**(6) : 539–558, 1935.

These studies were made in the Laboratory of Virus Diseases, Ukrainian Inst. of Plant Protection, U.S.S.R., Kharkow, Sozselchos House. That is probable due to a virus. Was reported from Crimea and Australia in 1933. The author gives a very thorough discussion of the subject.

Miles, A. C.

Report of the Department of Agriculture, Gold Coast, for the year 1934–35, 17 p., 1935.

This report contains very interesting notes on the breeding work and the result obtained with resistant varieties of cassava to mosaic disease. It contains also notes on tobacco and sugar cane virus diseases.

Moore, E[nid] S[tella], & Wager, V. A.

Kromnek: A serious tomato disease. Farming in South Africa. Reprint **51**, 1934.

A popular discussion.

Mottet, S[éraphin] J[oseph]

La dégénérescence de la pomme de terre. (Degeneration of potatoes.) Journ. Soc. National, Hort. France **23**: 263–268, 1922.

The author says that virus diseases are among several causes.

Mouraskinsky, K. E.
(New diseases of cultivated plants in western Siberia.) Trans. Omst. Inst. Agric. **1**(6): 3–30, 1935.

This report includes much data on some virus diseases specially on wheat and rye new to the area.

Muncie, J[esse] H[oward]
History and development of potato disease. Ohio Veg. Grow. Asso. **19**: 128–139, 1934.

Yellow dwarf disease of potatoes. Michigan Agric. Expt. Sta. Spec. Bull. **260**, 18 p., 1935.

This virus disease is transmitted by *Macrosiphum solanifolii*.

Mungomery, R. W., & Bell, Arthur F[rank]
The spread of Fiji disease by insects. Cane Growers' Quarterly Bull. (Bureau of Sugar Expt. Station, Queensland), **1**(1): 20–23, 1933.

Popular.

Murphy, Paul A[loysius]
Identity and spread of some potato viruses of the mosaic group. Int. Bot. Cong. Proc. **2**: 198–201, 1935.

Noble, R[obert] J[ackson]
Woodiness of passion fruit, Trop. Agric. (Ceylon) **72**(1): 48–49, 1929.

A review of a paper in Agric. Gaz. N. S. Wales, **39**(9): 691–693, 1928.

Filterable viruses. Report of the Australian and New Zealand Association for the Advancement of Science, Vol. XXI, 1933.

"It is considered that the peculiar symptoms of virus diseases in plants may be due to the close association between the virus particles and the constituents of the cells, and that the diseases are caused by living organisms, although this has not been demonstrated conclusively."

"Virus disease symptoms may be masked by changes in air temperature and light intensity. This apparent recovery of the affected plants may explain why so many specifics have been offered for the elimination of these diseases. Properly conducted tests have demonstrated that these preparations are not of any value."

"Although a plant virus may affect many unrelated plants with production of symptoms, it is of possible greater significance that a virus may also be harboured by a plant without any evidence of symptoms."

"These virus carriers should be examined much more closely as they may help to provide further information on the nature of these diseases, thus leading possibly to the development of new control measures; the carriers also may be potential sources for the develop-

ment of even more serious virus infections when circumstance favor the transfer of the hidden virus alone or in combination with other plant viruses to other plants.''

Some aspects of problems associated with the preservation of health in plant. Presidential Address, Reprint from the Journal and Proc. of the Royal Society of New South Wales. **69**: 1–34, 1935.

A part of this paper is devoted to a general discussion of virus diseases.

Australia: Notes on plant diseases recorded in New South Wales for the year ending 30th June, 1934. Int. Bull. Plant. Prot. **9**(1): 2–5, 1935.

This report includes notes of a new record of streak disease in tomato and a rosette disease of sweet potatoes.

Australia: Notes on plant diseases recorded in New South Wales for the year ending 30th. June, 1935. Int. Bull. Plant Prot. **9**(12): 270–273, 1935.

In this report a brief note is included recording the occurrence of tomato spotted wilt virus in dahlias and *Schizanthus*.

Nolla, J[osé] A[ntonio] B[ernabé]

Studies on disease resistance. I–A tobacco resistant to ordinary tobacco mosaic. Journ. Agric. Univ. Puerto Rico **19**(1): 29–49, 1935.

The *Ambalema* tobacco is resistant to tobacco mosaic but developed symptoms which are described. It is also resistant to yellow tobacco mosaic and celery mosaic. It is very susceptible to cucumber mosaic, yellow cucumber mosaic, potato ring spot, Wingard's tobacco ring spot and spot necrosis. It is less susceptible to the mottle and vein-banding viruses.

North, D[avid] S[utherland], & Barber, E. G.

Fiji disease and varieties. Proc. Fifth Congress, Int. Soc. Sugar Cane Tech., Brisbane, Australia, **1935**: 498–505, 1936.

Ogilvie, L[awrence]

Notes on lilies. Agric. Bull. Bermuda Dept. Agric. **6**(4): 4–5, 1927.

Report of inspection of *Lilium longiflorum* var. *eximium* for mosaic, inoculations and the results.

An important virus disease of *Lilium longiflorum* and its varieties. Nature **119**(2997): 528, 1927.

A report of yellow flat on *Lilium longiflorum, L. giganteum (L. longiflorum* var. *takesima), L. formosum (L. longiflorum* var. *insulare), L. banisii (L. longiflorum* var. *eximium.)* Transmitted by *Aphis lilii*.

The Bermuda Easter Lily. Royal Bot. Soc. London Quart. Summary **39**: 4–6, 1929.

A popular discussion of the history of the host and the mosaic disease.

Spotted wilt of tomatoes and its control. Annual Report of the Agric. & Hort. Res. Station, **1934**: 170–174, 1935.

This paper gives a valuable list of hosts of this disease and recommendations for its control. The thrips should be controlled by nicotine fumigation and spraying, diseased plants should be removed and workers should wash their hands with soap and water after touching diseased plants.

Oortwijn, Botjes J. G.

De stand van het immuniteitsvraagstuk bij viruziekten van de planten. (The status of the immunity problem in virus diseases of plants.) Tijdschr. Pl. Ziekt. **42**(1): 1–9, 1936.

Based on the current studies in Europe and United States the author discusses the problem of immunity in relation to virus diseases of plants.

Orton, C[layton] R[oberts], & Henry, W. D.

An internal necrosis of bean seeds. Phytopathology **25**(7): 726–728, 1935.

A brief description of a disease that may be due to a virus.

Otero, José I[dilio], & Cook, Melville T[hurston]

Partial bibliography of virus diseases of plants. Journ. Agric. Univ. Puerto Rico **18**(1–2): 1–410, 1934.

A bibliography of more than 3,000 papers.

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First supplement to partial bibliography of virus diseases of plants. Journ. Agric. Univ. Puerto Rico **19**(2): 129–313, 1935.

This publication contains a large number of titles and indexes to the original and supplement mentioned above.

Pal, B. P., & Nath, P.

Phyllody: a possible virus disease of *Sesamum*. Indian Journ. Agric. Sci. **5**(4): 517–522, 1935.

The authors report this new disease on *Sesamum indicum* at Pusa. The evidence so far is that it is caused by a virus and is characterized by the bearing of the affected plants of flowers in which all the floral members except the stamens are transformed into leaf-like organs or show a marked tendency to become leafy. The symptoms of the disease are well described.

Palm, B[jorn] T[orvald]

Pricksjukans problem. Ennyorientering. (The bitter pit problem. A reorientation.) Teidem pages 11, 1924.

The author suggests that this disease is due to a virus. This is the earliest suggestion that this disease is due to a virus that has come to our attention.

Applets prinecksjuka. En cytologisk undersökning. (Bitter pit in apples. A cytological study.) Sv. pomol. Foren Arsskrift, 15 p., 1915.

Pape, H[einrich]

Über eine mosaikkrankheit der Kohlrübe (On a mosaic disease of the Swede) Dtsch. Landbw. Pr. **62**(26) : 319–320, 1935.

A description and results of experiments. The virus is transmitted by *Lygus pratensis.*

Park, M[alcolm]

Report on the work of the Mycological Division. Adm. Rept. Dir. Agric. (Ceylon) **1934**: D124–D131, 1935.

In this report are included notes on virus diseases on *Capsicum annuum, Solanum nigrum* and *S. laeve;* also bunchy top of plantains.

Pascalet, M.

Note sur mosaïque du manioc (lepre du manioc) au Cameroun et au Nord du Gabon, Niet gepubliceerd rapport, 1931.

Pemberton, C. E.

The insect vectors of virus diseases of sugar cane. Proc. Fifth Congress Int. Soc. Sugar Cane Tech. Brisbane, Australia, p. 118–120, 1936.

A very brief review with list of species of *Perkinsiella.*

Peters, L., & Schwartz, M.

Krankheiten and beschädingen des tabaks. Mitt. Biol. Land- und, Forswirtsch. Berlin 128 pp., 1912.

Petherbridge, F. R., & Stirrup, H. H.

Pests and diseases of the sugar-beet. Bull. Minist. Agric. London, 58 p., 1935.

The virus diseases discussed includes mosaic, yellows and crinkle, which is done to some extent.

Petri, L[ionelo]

Deuterophoma tracheiphila e malattie da virus degli agrumi. (*Deuterophoma tracheiphila* and virus deseases of Citrus.) R. C. Accad. Lincei **21**(5) : 301–306, 1935.

The author discusses a number of points of Attanasoff's interpretation of "mal seco" of lemon and other Citrus as a virus disease. He gives the results in the control of the disease and the relation of *Deuterophoma tracheiphila* to it.

Pfankuch, E.

Zur biochemie des kartoffelabbaues. I. Nachrichtenbl. Deut. Pflanzenschutzld, **14**: 38, 1934.

Zur Biochemie des Kartoffelabbaunes. II. Mitteilung: Ascorbinsäure, Glutathion und Zucker. (A contribution to the biochemistry of potato degeneration. Note III Ascorbic acid, glutathion and sugar.) Biochem. Zeitung **279**(1–2) : 115–130, 1935.

Studies made with leaf roll virus and the named reagents. Account of results obtained.

Pierce, W. A., & Walter, J. C.

New mosaic resistance refugee bean is developed. Canning Age **15**(2) : 83–84, 1934.

Popular.

Pierce, W[alter] H[oward]

The inheritance of resistance to common bean mosaic in field and garden beans. Phytopathology **25**(9) : 875–883, 1935.

Account and discussion of the experimental results obtained in varietal resistance to common bean mosaic.

Pirone, P. P.

Spotted wilt of tomatoes and peppers in New York. Plant Disease Reporter **19**(15) : 244. 1935.

A record of the disease on *Lycopersicon esculentum* and *Capsicum annuum.*

Pivovarova, R., & Gorelik, I.

Tests of Rouzinov's and other methods for estimating the soundness of potato tubers. Trans. Lenin Acad. Agric. Sciences. **1936** : 51–58, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. The authors reject Rouzinov's method and reports progress with another.

Plank, J. E. van der

Internal brown fleck of potatoes. Farming in South Africa. **8** : 383–384, 1933.

Porter, D. R.

Insect transmission, host range, and field spread of potato calico. Hilgardia **9**(8) : 383–394, 1935.

A discussion of experimental work. *Macrosiphum solanifolii (M. gei)* is a vector. The disease was transmitted by mechanical inoculation to *Lycopersicon esculentum, Capsicum annuum, Datura stramonium* and *Petunia* sp.

Price, W[illiam] C[onway]

Acquired immunity from cucumber mosaic in Zinnia. Phytopathology **25**(8) : 776–789, 1935.

Cucumber mosaic yellow strain No. 6 and tobacco mosaic 302 A attacked *Zinnia elegans.* Plants that became mottled with four strains of cucumber mosaic virus were immune to No. 6 but not to 302 A. Plants that became mottled as a result of tobacco mosaic or aucuba

mosaic viruses were immune to 302 A, but susceptible to No. 6. Plant infected with tobacco ring spot, yellow ring spot or severe etch viruses were not immune to either No. 6 or No. 302 A.

Classification of southern celery-mosaic virus. Phytopathology **25**(10) : 947–954, 1935.

The author summarizes his work as follows: "Infection of zinnia plant with southern-celery mosaic virus induces in them a specific immunity from a yellow strain of cucumber-mosaic virus (strain 6). Celery-mosaic virus and cucumber-mosaic virus, therefore, are closely related immunologically and it is believed, should be classified as strains of the same virus. Corroborative evidence is found in the fact that the symptoms produced by celery-mosaic virus in *Zea Mays*, L., *Commelina communis* L., and *Vigna sinensis* L. Endl. are similar to to those produced by ordinary cucumber-mosaic virus in the same hosts."

Virus concentration in relation to acquired immunity from tobacco ring spot. Science (Abstract) **32**(2139) : 621–622, 1935.

This is an abstract of a paper presented at the autumn meeting of the National Academy of Science.

Virus concentration in relation to acquired immunity from tobacco ring spot. Phytopathology **26**(6) : 503–529, 1936.

This is a continuation of previous work by the author. He found (1) that ring spot virus multiplied in tobacco plants that had recovered from the disease, (2) leaves of diseased plants contained 5 to 10 times as much virus as leaves from plants that had recovered, (3) basal parts of leaves from plant that had recovered contained less virus than the apical parts, (4) fully recovered leaves contained more virus than healthy appearing parts of partly recovered leaves, (5) the virus content of recovered leaves was not increased by reinoculation, (6) the roots of recovered plants contained less virus than the roots of plants that had not recovered, (7) no essential difference in virus in stems of plants that had recovered and those that had not recovered, (8) recovered plants grown through 10 generations from cuttings contained less virus than diseased plants.

Specificity of acquired immunity from tobacco-ring-spot diseases. Phytopathology **26**(7) : 665–675, 1936.

Pullen, A. R., & Wassermann, J.

Some observations on potato "degeneration" in South Africa. South African Journ. Sci. **32** : 271–279, 1935.

Account of a survey of potato virus diseases of occurrence in South Africa viz. Apical leaf roll, giant hill, spindling sprout, spindle tuber, and yellows (mosaic).

Putman, D. F.

The analysis of a complex mosaic of President potato. Sci. Agric. (Abstract) **15**(6) : 437, 1935.

Quanjer, H[endrik] M[arius], & Gaumann, E.

Versuche über den Einfluss des Klimas auf den Gesundheitszustand der Kartoffel-pflanze. (Experiments on the influence of climate on the state of health of the potato plants.) Phytopath. Zeittschr. **8**(4) : 307–321, 1935.

Studies in potato ecology. The authors give the results of their observations in Switzerland to determine the influence of altitude on the incidence, virulence and course of the anecrotic type of mosaic disease.

----------, **& Thung, H. M.**

Classification of potato viruses and tobacco-viroses in Java. Int. Bot. Cong. Proc. **2** : 199, 202–203, 1935.

Historique des recherches sur la jaunisse et la mosäique de la betterave (The development of the research into the yellow-spot and mosaic disease of the beet) Publ. Inst. Belge Amel. Betterave **4**(2) : 23–33, 1936.

De vergelings ziekte en de mosaikziekte van suiker-en vowderbeiten. I. Geschiedenis van het onderzoek over de vergelingsziekte en de mosaiekziekte van de biet. (Virus yellows and mosaic disease of sugar-and fodder beet. I. History of the investigations on Virus yellows and mosaic.) Inst. Phytopath. Lab. Mycol. en Aardappelonderzoek, Wageningen, Holland, Meded, **77** : 45–54, 1936.

Review of the work done by other workers giving the symptoms of the diseases.

----------, **& Roland, G.**

De vergelingsziekte an de mosaikkziekte van de suiker—en volderbiet. I–II. I. Geschiedenis van het onderzoek over de vergelingsziekte en de mozaiekziekte van de biet. (History of the investigation on virus yellows and mosaic. (Netherlands). II. Onderzoek van de vergelingsziekte van de biet, met enkele opmerkungen over de mozaicksiekte. (Investigation on virus yellows and some remarks on mosaic, Belgium.) Tijdschr. Plantenz. **42**(3) : 45–70, 1936.

Rafay, S. A.

Physical properties of sugar-cane mosaic virus. Indian Journ. Agric. Sci. **5**(6) : 663–670, 1935.

Account of inoculations made of sugar cane virus and its responds to several reagents.

Ragallar, Franz

Der Abbau. Eine ent-wicklungsgeschuchtliche studie zum senilitäts-und Fortpflanzunsproblem. 85 p. G. Fischer, Jena? Adv. on front cover Bot. Cent. **26**(168) H. ½, 1934.

Rands, R[obert] D[elafield], Abbott, E[rnest] V[ictor], & Summers E[aton] M.

Disease resistance tests on sugar cane-seedlings and initial selection procedure in the Southern United States. Proc. Fifth Congress Int. Soc. Sugar Cane Tech., Brisbane, Australia. p. 484–492, 1936.

This paper contains a discussion of method for testing for mosaic reactions.

Rangaswami, S., & Sreenivasaya, M[ontnahalli]

Insect transmission of spike disease of Sandal (*Santalum album* Linn.) Curr. Sci., **4**(1) : 17–19, 1935.

The results of studies with a large number of species of insects. Two species of Jassidae, three of Fulgoridae and three of Pentatomidae are suspected as being vectors.

----------, & Varadaraja Iyengar, A. V.

Experiments conducted by the Madras Forest Department in Collaboration with the Indian Institute of Science, II. Indian Inst. Sci. Bangalore, Invest. Spike disease of Sandal **7** : 8–11, 1933.

A report on experiments for the killing of spike-diseased sandal trees.

Rao, M. G. Venkata, & Gopala, Iyengar

Studies in spike disease of sandal. Two types of spike diseases and the movement of the virus in sandal plants. Mysore Sandal Spike Invest. Comm. Bull. **4**, 14 p., 1934.

Two strains of the disease are described. The active agent does not pass through the ringed stems but through parts of the phloem and cortical parenchyma.

Ravaz, L.

Le court-noue. (Short node of grapes). Prog. Agric. et Vitic. **81** : 424–426, 447–452, 1924.

Believed to be due to soil conditions and to parasitism of smaller roots by a fungus.

Rawlins, T[homas] E[lsworth], & Tompkins, C[hristian] M[ilton]

Studies on the effect of carborundum as an abrasive in plants virus inoculation. Phytopathology **26**(6) : 578–587, 1936.

Finely powdered carborundum was found to be great aid in the inoculation of plants with viruses.

Reddick, D[onald]

Seed transmission of potato virus diseases. Amer. Potato Journ. **13**(5) : 118–124, 1936.

Reinmuth, E[rnest] F[riedrich]

Ein weiterer beitrag zur frage der eisenfleckigkeit der kartoffel. Zeitschr. Pflanzenk. **44** : 117–119, 1934.

Remacle, G.
Maladie nouvelle de la pomme de terre. (New potato disease). La Nature **63**(2):29, 1935.

Reyneke, J. & Ekteen, L. L.
Bitter pit of apples. Farming in South Africa, 4 p., 1934.
Popular.

Rhode, G.
Kali im Stoffwechsel der Pflanzen unter besonder Berücksichtigung del Kalimangelerscheinungen au Kartoffeln. (Potash in plant metabolism with special reference to potash deficiency manifestations in Potatoes.) Ernähr. Pflan. **31**(13–14):237–243, 1935.
This is not a virus disease paper, but we decided to include it for the interesting notes that it contains on virus diseases. Here it is stated that potash deficiency is liable to promote infection by mosaic, and other diseases such as streak and leaf roll.

Rjachovsky, N.
Tomato leaf-roll in the Woronezh and Kursk provinces. Trans. Lenin Acad. Agric. Sciences. p. 79–81, 1936.
Paper read before the First Virological Conference, March 7–11, 1935. A description of the disease, discussion of yield and methods of control.

Riddle, Oscar
The confussion of tongues. Science **83**(2142):41–45; (2143): 69–74, 1936.
This is not a paper on virus diseases but contains a brief discussion concerning the origin of life and viruses that is very interesting.

Rischkow, V[itolij] L.
(Mutations and diseases of the chloroplasts.) Ukranian State Medical Publishing Board, p. 354, 1934.
Much of this paper is devoted to a discussion of virus disease.

----------, Michailova, P. V., & Pivovarova, R.
Virus diseases of Solanaceae in experiments of 1934. Trans. Lenin Acad. Agric. Sciences. p. 112–118, 1936.
Paper read before the First Virological Conference, March 7–11, 1935. Discussion of a disease caused by virus 1 of leaf-fern of tomato which corresponds to tobacco mosaic. Also of crinkle of tomato.

----------, & Karatchevsky, I. K.
(Experiments on the artificial transmission of virus diseases of the Tomato. Virus Diseases of plants in the Crimea and the Ukraine.) State Publ. Office of the Crimea Simperopol, p. 7–30, 1934.
A brief list of virus diseases of tomato and a description of the woody fruit or stolbur disease. May be carried by *Agallia sinuata*. The mosaic and fern leaf in Crimea are caused by the same virus (Johnson's tobacco virus No. 1.)

(Virus diseases of plants. General and specific virology.) State Publ. Off. Lit. Collect. Co-op. Farming "Selkhozgiz" Leningrad 247 p., 1935.

In this monograph the author reviews and discusses the progress attained in the study of virus diseases, the work done by other workers in different countries and the several theories advanced. The second part is a detailed account of the virus diseases known arranged by hosts. A 20 pages of bibliography is appended.

Filtrirbarer virus und formbildung (einfluss der filtrierbaren virus auf die formbildung, in bezug der frage nach dem wesen des ultravirus.) Int. Bot. Cong. Proc. **2**: 195–197, 1935.

Virus diseases of plants and the nature of filterable virus: Trans. Linin Acad. Agric. Sciences. p. 11–12, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. A brief review. The recent work indicates that the virus is dead substance of an enzymoidal character. The most interesting and encouraging phase of the subject is the field of physico-chemical investigations.

Rivera, V.

I virus filterabili nella patologia vegetale. (The filterable virus in plant pathology.) V Cong. Naz. de Microb. Agrar. Perugia, Lab. Patol. Veg. Mem. **45**: 47, 1934.

Experimental inoculation with sap from tobacco plants with streak. The virus has no effect on old organs but stimulates young ones. Also stimulates the neoplastic tissues in plants infected with *B. tumefaciens*. The sap from a diseased plant fermented less easily than that from a healthy plant. In some cases the virus caused fungi to grow slowly.

Roberts, R. H.

"Crinkle" on northwestern greening. Phytopathology **9**: 261–263, 1919.

A description of this injury which has not been proved to be due to a virus.

Roland, G.

De vergelingsziekte en de mozaiekziekte van suiker-en voederbieten. II Onderzoek van de vergelingsziekte van de bit, met enkele opmerkingen over de mozaiekziekte. (Virus yellows and mosaic disease of sugar and fodder beet. II Investigation on Virus yellows and some remarks on mosaic.) Inst. Phytopath. Lab. Mycol en Aardappelonderzoek Wageningen, Holland. Meded **77**: 54–70, 1936.

Reviews and compares the work of others giving results obtained. (This paper is also included under Quanjer.)

Roshalin, L.

The nature of the concentric necrosis of the potato tuber. Trans. Lenin Acad. Agric. Sciences. p. 69–73, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. (English summary.) This disease appears to be due to soil conditions.

Russell, T. A.

Report of the Plant Pathologist, 1934. Bermuda Bd. Agric. Rpt. **1934**: 24–32, 1935.

In this report is included the description of a disease on lily known as "twist," characterized by excessive mottling and torsion of the leaves, tentatively is attributed to a virus.

Russo, G.

Il raggrinzimento o arricciamento del cotone nella Somalia Italiana. (Coiton leaf curl or crinkle in Italian Somaliland.) Agric. Colon **29**(2) : 78–95; (3) : 133–143; (4) : 188–199, 1935.

In this extensive report the author discusses the symptoms of the disease and gives experiments, based on them he concludes that the disease does not belong to the virus group of diseases.

Sadebeck, R.

Maniok oder Cassava, *Manihot utilissima* Pohl: p. 74–77.

Sakimura, I, & Carter, Walter

The artificial feeding of Thysanoptera. Annals Ent. Soc. Amer. **27**(2) : 341–342, 1934.

This paper is of interest because it is a study of *Thrips tabaci* which is a vector of virus diseases.

Salaman, Redcliff N[athan]

Research in relation to the production of "good" potato seed. Hort. Educ. Ass. Year-book Vol. II, 1933. (Agric. Progress, **11** : 77–86, 1934.)

A part of this paper is devoted to the propagation of virus-free stocks. The Author describes the method.

Salmon, E[rnest] S[tandley], & Ware, W[illiam]

The chlorotic disease of the hop. IV. Transmission by seed. Ann. Appl. Biol. **22**(4) : 728–730, 1935.

28 to 228 seedlings grown from seed from a diseased plant showed symptoms of the disease.

Samuel, G[eoffrey], Best, R. J., & Bald, J[ames] G[rieve]

Further studies in quantitative methods with two plant viruses. Ann. Appl. Biol. **22**(3) : 508–524, 1935.

The authors give a tabulated account of the factors which influence the estimation by the primary lesion method of the concentration of the viruses of tobacco 1 and of spotted wilt of tomato.

Scarlett, Robert L.

Historical notes on the leaf-roll of potatoes. Scot. Journ. Agric. **16** : 487–486, 1933.

Schander, Staar, et al.
Bericht über die Tätigkeit des Institutes für Pflanzenkrankheiten, 1933. Landw, Jahr. **79**: 14–22, 1934.

Schlumberger, Otto
Die Eisenfleckigheit der kartoffel. (The Eisenfleckigkeit of potato.) Die Kartoffel **13**: 83–85, 1933.

Schmidt, E[rnst] W[illy]
Bericht über neure Arbeiten zur Biologie der Zuckerrübe (Report on recent investigations on the biology of the sugar beet.) Deutsch. Zuckerindustr. **60**(40): 864–866; (42): 901–902, 1935.

The author reports personal observations in connection with a review of recent work on leaf spot (*Cercospora beticola*), curly top and mosaic of beets. He states that in experiments at the Kleinwanzleben Research Institute in the transmission of beet mosaic by juice inoculations gave negative results and the suggestion is made that Verplancke's reputed success in this operation is based on an erroneous interpretation of his observations.

Das Vergilben der Zuckerrübenblätter. (The yellowing of sugar beet leaves.) Dutsch. Zuckerindust. **40**(1): 20, 1935.

Note giving the different yellowing of sugar beet leaves and its causes, includes the virus type of yellowing.

Zur Physiologie und Pathologie des Vergilbens der Zuckerrübenblätter. (On the physiology and pathology of the yellowing of sugar beet leaves.) Z. Wirtschaftsgr. Zuckerindustr. **85**(3): 200–214, 1935.

A continuation in Germany of the author's works reported above.

Zur pathologischen Physiologie albicater und mosaikkranker Zuckerrüben-Blätter. (On the pathological physiology of albicant and mosaic diseased sugar beet leaves.) Phytopath. Zeitschr. **8**(4): 363–368, 1935.

The author gives the results of his observations and experiments based on chemical analysis and microscopical examination.

Der stand der Forshung über Viruskrank-heiten der Zuckerrübe. (The situation of the investigations on virus diseases of sugar beet.) Zuckerrübenbau **18**(1): 4–13, 1936.

Review of the work done on research of virus diseases of sugar beet during the past few years.

Schreven, D. A. van
Kalkgebrek als oorzack van mergnecrose bij Aardappelknollen. (Lime deficiency as the cause of medullary necrosis of potatotuber.) Tijdschr. over Plantenziekten **40**(11): 225–225, 1934.

This disease resembles a necrosis caused by a virus.

Virusziekten van de tomaat. (Virus diseases of the tomato.) Tijdschr. over Plantenziekten **11**(10) : 261–300, 1935.

A summary of the subject. Only one virus disease of tomato (tobacco virus No. 1) known in Holland. The author describes a Huissen disease.

Serrano F[elicisimo] B.

Pineapple yellow-spot in the Philippines. Philip. Journ. Sci. **58**(4) : 481–491, 1935.

General account of this disease first observed in Hawaii in 1928. Symptoms of the disease and transmission experiments are given.

Severin, H[enry] H[erman] P[aul], & Freitag, J[ulius] H.

California celery mosaic diseases. Phytopathology (Abstract) **25** (9) : 1935.

Shapovalov, Michael

Graft versus insect transmissions of curly top in tomatoes (tomato yellows) Phytopathology **25**(9) : 844–853. 1935.

This paper contains results which are very valuable. Insect transmission was more certain than graft transmission.

Effect of certain chemical on the "combination streak" virus of tomatoes. Phytopathology **25**(9) : 864–874, 1935.

This paper contains records of the effects of many chemicals on the two viruses causing tomato streak.

---, & **Dufrénoy J[ean]**

Cytologische beobachtungen an einer viruskrankheit von Typhus "streak" oder "Strichel". Path. Zeitsch. **8**(3) : 297–231, 1935.

Work on virus diseases of plants in United States of America. Trans. Lenin Acad. Agric. Sciences. pp. 24–31, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. A brief review. Refers to the wealth of plant material in the U.S.S.R. and the desirability of knowing more about the virus diseases.

Shepherd, E[dward] F[rederick] S[isnett]

A new disease of tobacco, possibly of the virus type. Mauritius Dept. Agric. Leaflet **40**, 3 p., 1936.

The author gives the symptoms of the disease, compares it with other tobacco virus diseases, gives distribution and recommends roguing.

Simmonds, J[ohn] H[oward]

Diseases of the banana. Queensland Agric. Journ. **43**(3) : 254–267, 1935.

Popular notes on banana virus diseases are included.

Skuderna, A. W., Price, C., Gulbertson, J. O., & Cormany, C. E.
The curly-top resistant beet variety. Facts About Sugar **31**: 17, 1936.

Slagg, C. M.
New and unusual diseases and injuries of tobacco. Sci. Agric. **6**(6) : 193–198, 1928.

Smith, Kenneth M[anley]
Remarks on the size of plant-viruses. Arch. Expt. Zellforsch. **15**: 1934.

Colour changes in wall-flowers and stocks. Gar. Chron. **93**(2537) : 112, 1935.

This is a brief discussion of color changes due to virus diseases in wall flower and other plants.

New virus diseases of the tomato. Journ. Hort. Soc. **60**(10) : 448–451, 1935.

The author describes the symptoms of three virus diseases and designates them by number.

A new virus disease of the tomato. Ann. Appl. Biol. **22**(4) : 731–740, 1935.

A description of a virus which attacks tobacco(*Nicotiana glutinosa, N. langsdorfii, Datura stramonium,* potato, cowpea (*Vigna sinensis*), *Mimulus, aster & Zinnia.*

A new virus diseases of tomatoes. Nature **135**(3422) : 908, 1935.

A description of a new virus disease attacking tomatoes and cowpeas (*Vigna sinensis*).

Plant viruses. A book. Methuen (London) 107 p., 1935.

A general discussion of the subject.

---, **& Bald, J[ames] G[rieve]**
A description of a necrotic virus disease affecting tobacco and other plants. Parasitology, **27**(2) : 231–245, 1935.

This author describes this new disease and gives the symptoms on several host. The method of transmission in nature is not known but it can be transmitted to cowpeas by spraying with an atomizer. The dilution end-points appears to be about 1: 10,000, the longevity in sap about 20 days, the thermal death point about 72° C. and the particle size 20–30 μ μ.

Two strains of streak: a virus affecting the tomato plant. Parasitology, **27**(3) : 450–460, 1935.

The author describes a green strain of tomato virus-I, on a variety of Solanaceous plants and also yellow variant. They can be separated by filtration. A complete cross-immunity exists between the two.

---, **& Doncaster, J. P.**

The preparation of gradocol membranes and their application in the study of plant viruses. Parasitology **27**(4) : 523–542, 1935.

The authors give a detailed account of the technique established after three years study for the preparation of Elford's gradocol membranes and their application to the study of plant viruses.

The virus diseases of glass house and garden plants. Sci. Hort. **4**: 126–140, 1936.

Popular descriptions of virus diseases of many plants.

The problem of a plant virus infection. Nature **136**(3436) : 395–396, 1935.

This is a continuation of the studies by the author and Bald on a necrotic virus disease of tobacco. Parasitology **27**(2) : 231–245, 1935. The virus found in the roots of apparently healthy tobacco plants.

Some diseases of ornamental plants caused by the virus of tomato spotted wilt. Journ. Roy. Hort. Soc. **60**(7) : 304–310, 1935.

The author gives a preliminary discussion of the diseases, explains the method of spreading and discusses the relation of the disease on several hosts.

Recent work on the plant viruses. Curr. Sci. **4**(8) : 565–569, 1936.

An excellent review of the recent work on plant viruses, especially the insect vectors, the nature of the virus and the chemical and serological studies.

Some aspects of the plant virus problem. Sci. Progress, **30**(119) : 413–421, 1936. (Rhodesia Agric. Journ. **33** : 134–142, 1936.)

An address before section K. of the British Association. The author gives a brief but excellent discussion of the subject.

Soltan, F.

Erfahrungen über die eisenfleckigkeit der Kartoffel. Deut. Landw. Press **61** : 84, 1934.

Sornay, P. de

La cana á Sucre. Plantation par boutures de tetes it dégénérescence de la variéte. (Sugar cane. Planting with terminal slips and varietal degeneration). Bull. Ass. Chim. Suer. **42** (9–10) : 638–642, 1935.

The author discusses the different methods of plantings. He disagrees with Martin's theory of sugar cane sereh disease in regard to methods of planting. He discusses also sereh disease.

Spegazzini, C[arlos]

Sobre una nueva enfermedad del tabaco (Regarding a new disease of tobacco.) Bol. Oficina Químico-Agrícola, Buenos Aires 4: 1928

Spencer, Ernest L.

Studies on frenching of tobacco. Phytopathology **25**(12): 1067–1084, 1935.

This paper is recorded because this disease has been confused with mosaic. The author summarizes his results in part as follows: "In the genus *Nicotiana* frenching developed severely in *N. alata, N. langsdorffii, N. longiflora, N. rustica, N. sanderae, N. sylvestris,* and in 16 varieties of *N. tabacum,* but not in 12 other species of *Nicotiana* grown under similar conditions. Of the other solanaceous and non-solanaceous species, only *Datura stramonium, Lycopersicon esculentum,* and *Petunia hybrida* showed chlorosis characteristic of frenching." "No association was found between frenching and any pathogenic organism." "Experiments on the deficiency of each of the elements essential to plant growth failed to produce symptoms that resembled those of frenching." "Frenching was produced in plants grown in sand by the addition at daily intervals of a water extract of field soil. It also was produced by adding as little as 1 part of field soil to 2,000 parts of sand. In young seedlings, in sand, it was produced by the addition of top water from a deep well, over a long period of time." "The experimental evidence indicates that frenching probably is not a mineral-deficiency disease, but a toxicity disease produced by some toxic principle that is present in certain soils and that exerts its toxic action only under definite environmental conditions.

Spierenburg, D.

Een virusziekte in lupinen. Donkers strepen en vleppen op de stengels; afsterven der toppeu; gekroesd of violetbruin blad. Tijdschr. Plantenz. **42**(3): 71–76, 1936.

Spooner, E. T. C., & Bawden, F. C.

Experiments on the serological reactions of the potato virus "X". Brit. Journ. Expt. Biol. **16**: 218–230, 1935.

The authors report a common antigen in the sap of tobacco, *N. glutinosa, D. stramonium* and potato infected with potato virus "X". They describe the methods and give the reactions.

Sreenivasa Rao, Y. V.

Contributions to the study of the spike-disease of sandal (*Santalum album.* Linn.) XVIII. Investigation of the hexone bases. Journ. Indian Inst. Sci. **16A**(8): 91–93, 1933.

Contributions to the study of the spike-disease of sandal (*Santalum Linn.*) XIX. Study of mosaic associated with spiked areas. Journ. Indian Inst. Sci. **16A**(8): 94–95, 1933.

Srinivasan, M.

Experiments conducted by the Indian Institute of Science. Laboratory Experiments. Indian Inst. Sci. Bangalore, Invest. Spike-Diseases Sandal. **7**: 12–13, 1933.

The diseased and healthy plants respond seasonal influences somewhat different.

---, & **Srinivasaya, M[ontnahalli]**

Contributions to the study of spike-disease of Sandal (*Santalum album,* Linn.) Part XVII. Hydrogen-ion concentration and buffering capacity as factors of disease resistance. Journ. Indian Inst. Sci. **17A**(14): 153–164, 1935.

Chemical and physiological studies.

---, & **Rangaswami, S.**

A new device for the insect transmission of spike disease of sandal. Curr. Science. **4**: 97–98, 1935.

Stanley, W. M.

Chemical studies on the virus of tobacco mosaic. IV. Some effects of different chemical agents on infectivity. Phytopathology **25**(10): 899–921, 1935.

The results of testing the effect of 110 chemicals on the purified preparations of tobacco-mosaic virus. "The fact that tobacco mosaic virus was found to be unaffected over long periods of time by concentrations of mercuric chloride known to be germicidal is an indication that the virus is not a bacterial organism."

Chemical studies on the virus of tobacco mosaic. V-Determination of optimum hydrogen-ion concentrations for purification with lead acetate. Phytopathology **25**(10): 922–930. 1935.

The author has determined the optimum hydrogen-ion concentrations for carrying out the three principal steps in the lead acetate process for the purification of tobacco-mosaic virus proposed by Vinson and Petri. The method and results are given.

Isolation of a crystalline protein possessing the properties of tobacco-mosaic virus. Science **81**(2113): 644–645, 1935.

The author isolated a crystalline protein compound from mosaic tobacco which produced the typical disease when injected into Early Golden Cluster bean, *Nicotiana glutinosa* and *N. langsdorffii.* He describes the method and says that although the proof of the purity of the protein is not positive, there is no evidence of a mixture.

---, & **Loring, H. S.**

The isolation of crystalline tobacco mosaic virus protein from diseased tomato plants, Science **83**(2143): 83, 1936.

They say: "The isolation from a different host plant of a protein possessing the same physical, chemical and biological properties as

those previously found for the protein from mosaic-diseased tobacco plant offers additional evidence for the identity of the protein with the agent responsible for the tobacco-mosaic disease.''

An improved method for the preparation of crystalline tobacco-mosaic virus protein. Phytopathology **26**(2): 108, 1936.

Abstract of paper read before 27th Annual meeting of the American Phytopathological Society, St. Louis, Mo., December, 1935. A description of a new method.

Chemical studies on the virus of tobacco mosaic. VI. The isolation from diseased turkish tobacco plants of a crystalline protein possessing the properties of tobacco mosaic virus. Phytopathology **26**(4): 305–320, 1936.

''A crystalline protein, which has the properties of tobacco-mosaic virus, has been isolated from an extract of Turkish tobacco plants infected with this virus. The extract was prepared by grinding frozen plants, adding disodium phosphate, and pressing out the liquid. The press cake was extracted a second time with dilute disodium phosphate and the two extracts were filtered through celite and combined. The virus protein was obtained from these extracts by precipitation with ammonium sulphate. The virus protein was reprecipitated with ammonium sulphate several times with loss of much color, and most of the remaining color was then removed with lead sub-acetate. The virus was adsorbed on, and removed from, celite several times and then crystallized in the form of small needles about 0.02 mm. long by the addition of a solution of 5 per cent glacial acetic acid in 0.15 saturated ammonium sulphate.'' ''The crystalline material has the general properties of a protein and its ineffectivity, chemical composition, and optical rotation were unchanged after 10 crystallinizations. The material is between 100 and 1,000 times more active than ordinary infectious juice preparations, one cubic centimeter of a solution containing 10^{9} gm. per cc. of the protein usually proving infectious. The crystalline material reacts with sera of animals injected with a solution of the crystals or with infectious juice, and fails to react with the sera of animals injected with juice from normal plants. All of the evidence obtained up to the present time indicates that the crystalline protein is pure or possibly a solid solution of proteins, and hence, that tobacco-mosaic virus is a protein.''

Stevens, Neil E[verett]

An attempted analysis of the economic effects of cranberry diseases. U.S.D.A. Plant Disease Reporter **19**(8): 112–128, 1935.

Extensive account of losses due to false blossom of cranberry.

Stevenson, F. J.

What's inside the potato. Amer. Potato Journ. **11**: 229–234, 1934.

Stewart, Fred C[arlton]

A potato seed plant roguing experiment. New York State Agric. Expt. Station (Geneva) Bull, **655**, 10 p., 1935.

The results of nine years experiments for the control of virus diseases.

Steyaert, R. L.

Étude du shedding en rapport avec la frisolée du cotonnier. (A study of shedding in relation to frisolée of cotton.) Bull. Agric. Congo Belge **26**(1) : 3–45, 1935.

Similar to tomosis. Not proved to be a virus.

Storey, H[arold] H[aydon]

Virus diseases of East African plants. I, II, & III. East African Agric. Journ. **1**(1) : 63–68; (2) : 148–153; (3) : 206–211, 1935.

Popular.

Report of the Plant Pathologist. East African Agric. Res. Stat. Rpt. **1934–35** : 12–16, 1935.

This report treats wholly on corn and cassava virus diseases.

On the future of research on the virus diseases of plants. Proc. Fifth Congress Int. Soc. Sugar Cane Tech. Brisbane, Australia p. 108–116, 1936.

The author predicts that the future studies of these diseases must center around species or strains of viruses and the vectors.

Strong, L. A.

Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1935, 96 p., 1935.

This report includes the work done to control phony disease of peaches.

Summers, Eaton M.

Strains of the sugar cane mosaic virus in Louisiana. Proc. Fifth Cong. Int. Soc. Sugar Cane Tech., Brisbane, Australia, 723–729, 1935.

A very thorough discussion of this subject to date.

Sundararaman, S.

Mosaic disease of sugar cane in South India. Madras Agric. Dept. Bull. **32**. 1929.

The results of a survey for 1925–28, with a discussion of symptoms and effects, methods of infection and spread, and varietal resistance.

The diseases of sugar cane. A paper read at the M.A.S.U. Conference, July, 1930 and published in the Madras Agric. Journ. of August, 1930.

This paper contains brief discussions of mosaic and streak.

The mosaic disease of sugar cane. Leaflet **31**, 2 p., 1931.

A popular discussion.

Tasugi, H., & Ikeno, S.

(On the intracellular bodies associated with the mosaic disease of the lily (Preliminary report). Ann. Phytopath. Soc. Japan, **5**(1) : 30–43, 1935.

A mosaic disease of *Lilium speciosum L. rubrum.* A study of the intracellular bodies.

Tate, H. D.

Intracellular abnormalities associated with yellow dwarf of onions. Iowa State College Journ. Sci. **9**(4) : 677–683, 1935.

A very few irregularly distributed bodies.

Thilliard, R.

La culture du tabac de Sumatra an Cameroun. (The culture of Sumatra tobacco in Cameroon.) L'Agron. Col. **6**: 185–194, 1921.

Bestrijding der krul-en kroepoek-ziekte van tabak. (Control of the curl and crinkle disease of tobacco). Meded. Proefstat. Vorstenl and. Tabak (Java) **78**: 18, 1934.

Thornberry, H. H.

Quantitative studies on the filtration of tobacco-mosaic virus. Phytopathology **25**(6) : 601–617, 1935.

The author gives the results of extensive studies and finds that (1) when dilutions of virus are passed through Berkefeld "W" filters the filtrates are as infective as nonfiltered, (2) at pH 8.5 the virus is completely filterable and at 1.5 nonfilterable, (3) virus suspended in an acid medium is adsorbed to the Berkefeld filter at the beginning of filtration. After the filter surface is saturated with adsorbed materials at pH 5.6, the filterate is about as infectious as the non-filtered sample until the clogged pores retain most of the virus, (4) virus adsorbed to the filters from an acid suspension is readily eluded in phosphate buffer at pH 8.5, about 80 per cent of the virus is released in 10cc. of the buffer, (5) filtration of virus at pH 8.5 through Berkefeld "W" candles increased its infectivity 66 per cent, (6) the dismeter of the virus particles is estimated to be 18–38 mμ.

Effect of phosphate buffers on infectivity of tobacco-mosaic virus. Phytopathology **25**(6) : 618–627, 1935.

These studies are summarized as follows: (1) Valency of the anion or cation of the salts tested had no measurable effect upon infectivity of tobacco-mosaic virus, (2) dibasic phosphate salts at 0.1 molar concentration greatly enhanced virus infectivity, (3) optimum reaction for infection is from pH 7.0 to 8.5, (4) virus was inactivated in 1 hour between pH 1.5 and 9.0. At pH 10.6 complete inactivation

resulted in 4 hours, and at pH 11.2 in 5 minutes and in 0.5 molar H Cl. inactivation was complete in 1 hour, (5) the presence of aluminum sulphate greatly reduced infection but when the reaction was adjusted to pH 8.5 the original virus activity was restored.

Effect of tannic acid on the infectivity of tobacco-mosaic virus. Phytopathology **25**(10) : 931–937, 1935.

The inhibition of the virus when treated with tannic acid depends on the concentration of the acid and time of action. The activity of the virus is restored by removal of the tannic acid from the suspension. The inhibition of the virus when the plants were treated with tannic acid before inoculation depended on the concentration of the acid. Tannic acid in concentrations as high as 10 per cent had slight effect when applied after inoculation with the virus.

Particle diameter of certain plant viruses and *Phytomonas pruni* bacteriophage. Phytopathology **25**(10) : 938–946, 1935.

Thirteen plant viruses were used and the diameters determined at about 15 mμ. In one tobacco virus the particles were found to have a diameter of 11 mμ which was the same as that of the particles of *Phytomonas pruni* bacteriophage.

Thornton, J. K.

Blackberries: Possible source of streak infection in black raspberries. Phytopathology **25**(10) : 959–961, 1935.

The author reports a streak disease of Blackberries which is the same as that reported by Zundel in 1934 and gives evidence that it is the same as the streak of black raspberries.

Thung, T. H.

Infective principle and plant cell in some virus diseases of the tobacco plant II. Handelingen v/h. 7 de Ned-Ind. Natuurwetenschappelijk Congress. **1935** : 496–507, 1935.

This is a continuation of the first paper (in Dutch) published under this same title in 1931. It is primarily a study of immunity.

Phytopathologische waarnemings (Phytopathological observations.) Meded. Proefst Vorstenl Tab. **81** : 25–37, 1935.

Notes on "Kroepoek" disease and "pox" a new virus disease are included in this report. The last disease is transmitted by *Myzus persicae*.

Tireman, H.

Proc. Spike Conference, Bangalore, 1917.

Trotter, A[lesandro]

Le virosi del *Cestrum parqui* L' Hérit. (Virus diseases of *Cestrum parqui* L' Herit) Ric. Ossuz. Divulg. Fitopat. Campania ed Mezzogiorno (Portici), **4** : 18–24, 1935.

A description of the disease.

Troy, Zeliaette,

Aster yellows and its control. Flor. Exch. **85**(16) : 13, 1935.

A review of Kunkel's work.

Tschernyschova, O. P.

Schädlichkeit von Viruskrankheiten der Kartoffel. (Damage from potato virus diseases.) Arb. Forsch. Inst. Kartoff., **1935**: 59–84, 1935. (Bot. Zbl. (Abstract) **27**(5–6) : 170–171, 1935.)

Data on production on potato affected by virus diseases in U.S.S.R.

———————

Contribution to the diagnostics of potato virus diseases. Trans. Lenin Acad. Agric. Sciences, p. 42–50, 1936.

Paper read before the First Virological Conference, March 7–11, 1935. The author divides these diseases into four groups: (1) mosaics, including mild mosaic, rugose mosaic and streak, (2) leaf roll, (3) witches' broom, and (4) aucuba. Uses the Bechhold and Erbe method of testing the coloring of the flesh.

Twort, F. W.

The transmissible bacterial lysin and its action on dead bacteria. The Lancet **209**(5326) : 642–644, 1925.

This transmissible lysin has some of the characters of a virus.

Valleau, William D[orney]

A method for describing strains of tobacco mosaic virus. Phytopathology **26**(2) : 111–112, 1936.

Abstract of a paper read before the 27th annual meeting of the American Phytopathological Society, St. Louis, Mo., Dec. 1935. The author described methods for the determination of 18 viruses.

———————

Do necrotic lesions result in localization of tobacco-mosaic virus in *Nicotiana?* Phytopathology **25**(10) : 968. 1935.

The author gives the results of studies which show that necrotic lesions do not always result in a localization of the virus.

———————, **& Johnson, E. W.**

Only certain strains of tobacco mosaic cause mosaic burn. Phytopathology (Abstract) **25** : 967, 1935.

Varadaraja Iyengar, A. V.

Experiments conducted by the Indian Inst. of Sci. II. Indian Inst. Sci., Bangalore Invest. Spike-Disease Sandal 7 : 14–15, 1933.

Methods for destroying diseased trees.

———————

Biochemistry of the spike disease of *Vinca rosea* Linn. Journ. Indian Inst. Sci. **18A**(9) : 61–67, 1935.

The author compares the results with those of spike on other hosts.

Deamination in virus-infected plants. Nature (London) **135** (3409) : 345, 1935.

A chemical study of spike of Sandal.

The problem of *Lantana*. Curr. Sci. p. 1, 1935.

---, & **Rangaswani, G.**

Studies in the control of the spike disease of sandal. Part **I.** The role of infection centre and Lantana in the spread of disease. Indian Forester **61**(1) : 25–34, 1935.

The rate of spread of the disease is independent of the size and age of the sandal plant. *Lantana* increases the incidence of the disease. The disease can be controlled by removal and burning.

---, & ---

Studies in the control of spike disease in Sandal. Part II. Use of plant poison in controlling the spread of infection. Indian Forester. **1935** : 103–111, 1935.

Arsenicals were the most successful chemicals. Girdling and smearing with the poison was most useful.

Verderevsky, D.

A new cotton disease in the Azerbaijan. Trans. Lenin Acad. Agric. Sciences **1936** : 74–78, 1936.

Paper read before the First Virological Conference, March 7–11, 1935, (English summary). A description of this disease which is transmitted by *Bemisia gossypiperda*.

Verplancke, G[ermain]

Étude des propertiétés des virus causant les maladies de dégénérescence de la betterave. (Study of the properties of viruses causing degeneration diseases of the beet.) Sucrerie Belge. **54**(7) : 118–127; (8) : 142–151; (9) : 162–168, 1935.

The results of experimental studies on yellows and mosaic. The author gives four types or symptoms of the mosaic,—sprenkel, nerven, marmor and porchen.

Étude d' une forme nouvelle de la "bigarrure" de la pomme de terre. Bull. Soc. Roy. Bot. Belgique **67**(2) : 105–116.

This appears to be a new disease. The authors give a description, a list of hosts and the results of experimental studies.

Vincent, C[hester] L[eon], & Jones, L[eon] K[ilby]

Resistance of potato varieties to infection by veinbanding virus. Phytopathology **26**(2) : 112, 1936.

Abstract of paper read before the 27th annual meeting of the American Phytopathological Society. St. Louis, Mo., Dec. 1935. A brief resumé of 12 years study on 1,055 strains of potato seedlings with reference to the veinbanding virus.

Vinson, C. G.
Virus diseases of plants. Purification of the virus of mosaic diseases of tobacco. Missouri Agric. Expt. Sta. Res. Bull. **237**, 16 p., 1936.

Wakeland, Claude, & Hungerford, C[harle] W[illiam]
Idaho recommendations for insect and plant disease control. Idaho Agric. Expt. Sta. Bull. **159**: 62–63, 1934.

Wartenberg, H., Linkowski, M., & Hey, A.
Der Tagesparzellenversuch. Beiträge zur methodik der Kartoffel abbauforschung. (The day plot experiment. Contributions to the technique of potato degeneration research.) Angew. Bot. **17**(1): 74–94, 1935.

The authors give an explanatory account of the "day plot experiment". Here is stated that basal roll, leaf roll and crincle coincided with the variations in the absolute atmospheric humidity prevailing during the planting times in the previous years. Potato degeneration is a metabolic anomaly induced by environmental conditions. Due to weakening of the plant by primary physiological disease are predisposed to attacks of virus diseases. Conclude stating that potato degeneration may thus eventually result from a leaf roll arising from ecological conditions and a virus component.

———————, Hey, A., & Urhan, O.
Die elektrometrische Pflanzgutwertbestimmung der Kartoffelknolle. I Mitteilung (The electrometric determination of the seed value of th potato tuber. Note I.) Arb. Biol. Reichsant. Land-u. Forstw **21**(3): 331–362 ,1935.

This is a highly technical discussion on the foundations of the electrometric method of determining the value of potato tubers for seed, with a view to the elimination by this means of individuals suffering from *degeneration*.

Webber, Irma E., & Fawcett, H[oward] S[amuel]
Comparative histology of healthy and psorosis affected tissues of *Citrus sinensis*. Hilgardia **9**(2): 71–93. 1935.

A very thorough and complete study of the histology of the diseased trees. These studies suggest that the cause is a virus.

Weij, H. G. van der
Ziekten der Tabak. (Tobacco diseases) Meded. Deli-Proefst. ser. II. **91**: 4–11, 1935.

This report includes discussions on the virus diseases mosaic ("peh sim"), Rotterdam B disease, "gilah", "korab" and "daon lidah".

Winter, H. C., & Young, H. C.
Raspberry virus disease control. Ohio Agric. Expt. Sta. Bimonth-Bull. **21**(179): 54–58, 1936.

Popular.

Wolcott, G[eorge] N[orton]

The first records of the mosaic disease of sugar-cane in Puerto Rico. Journ. Agric. Univ. Puerto Rico, **19**(2) : 117–120, 1935.

A statement of early observations in Puerto Rico, which have not been published previously.

Wolf, Frederick, A.

Diseases of tobacco caused by viruses. Chapter VI treats of Tobacco Diseases and Decays. p. 110–197. Duke University Press, 1935.

The author gives a general discussion of virus diseases and descriptions of many of the recognized diseases.

Youden, W. J.

Statistical aspect of the production of primary lesions of plant viruses. Nature, **135**(3426) : 1075, 1935.

A discussion of the failure of Samuel and Bald to reconcile their work with that of the author.

Zacharewicz, E.

L' enroulement des feuilles de la vigne. Prog. Agric. Vitic. **104** : 280–282. 1935.

After 20 years experiments, author finds that the disease is infectious, probably a virus disease, calls it an incurable disease of the sap." (Plant Science Literature, 2(15) : 14, Oct. 7–12, 1935.

Zaumeyer, W[illiam] J., & Wade, B. L.

The relationship of certain legume mosaic to bean. Journ. Agric. Res. **51** : 715–749, 1936.

The bean is susceptible to the mosaic viruses of pea, white clover, alsike clover, white sweet clover, alfalfa, and sweet pea. The mosaic virus of red clover is not transmissible to the bean.

_____, & _____

A pea streak caused by alfalfa mosaic. Phytopathology **26**(2) : 114. 1936.

Abstract of papers read before the 27th annual meeting of the American Phytopathological Society. St. Louis, Mo., Dec., 1935. This appears to be a new disease, different from the streak of Hawaii.

_____, & _____

Pea mosaic and its relationship to other legume viruses. Phytopathology **26**(2) : 114, 1936.

Abstract of paper read before the 27th annual meeting of the American Phytopathological Society. St. Louis, Mo., Dec., 1935. The paper gives the results of a yield survey of hosts. Only 11 out of 3,057 seedlings grown from mosaic plants showed symptoms of disease.

_____, **& Kearns, C. W.**

The relation of aphids to the transmission of bean mosaic. Phytopathology **26**(7) : 614–629, 1936.

Aphids are not found in large numbers in the bean fields but the spread of the disease is dependent on the abundance of these insects. Eleven species from 17 different hosts proved to be vectors.

Zeller, S[anford] M[yron]

Cherry mottle leaf. Ann. Rpt. Oregon State Hort. Soc. **26**: 92–95, 1934. (1935)

A brief description of a virus-like disease on Napoleon cherry.

Simultaneous infections of strawberries with crinkle and yellows (Xanthosis). Plant Disease Reporter. **22**(13): 208–209, 1936.

These two diseases are distinct. The virus of yellows appears to mask the crinkle. The vector for both diseases is *Capitophorus fragaefolii*.

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